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ABSTRACT

The American Industry Project represents one attempt to resolve the problem of providing career orientation for young people in a way which would: (1) avoid premature tracking, (2) help youth to identify the numerous career options open to them, (3) furnish base knowledges and coping strategies which help youth to adapt to change, and (4) establish a delivery system for teachers of the new program. Part I of this final report offers a narrative overview of the total project, addressing itself specifically to the achievement of the objectives of the project as stated in the original proposal, while Part II presents an analysis of the data collected and a description of the evaluation process used in developing and testing the curriculum materials. The Project developed a conceptual structure of the knowledges used in industry, and three secondary courses based on this structure were designed. Analysis of the data collected from the Project's achievement test revealed that approximately 40 percent of the students taught by instructors who followed the instructor's guide or used its objectives and content to at least a moderate degree achieved significantly higher scores than students in the control group. These and other results are discussed, and several project materials are included in the separate appendix section. (Authors/SB)

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FINAL REPORT
Project No. OE-5-85-060

THE ESTABLISHMENT OF AMERICAN INDUSTRY AS A TRANSITIONAL SUBJECT BETWEEN GENERAL AND VOCATIONAL EDUCATION

Eugene R. F. Flug and Orville Nelson
Stout State University
Menomonie, Wis. 54751

July 1971

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

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Final Report
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Menomonie, Wis. 54751

May 15, 1972

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Robert Swanson, Dean of the Graduate College, also provided wise counsel in the early stages of the project and played an important part in the development of the basic rationale underlying the effort.

Wesley Sommers, Vice President for Administrative Services, was instrumental in leading us to a clearer focus on planning as a central part of the project operation.

Herbert Anderson, Dean of the School of Industry and Technology, kept us honest with his critical analyses of the program and has now committed his school to the continuing development and implementation of the concept.

Wesley Face, Vice President for Academic Affairs, was a co-director of the project for most of its duration and provided a most significant input to the basic concept, direction of the project and development of the materials. His energy and intelligence were an inspiration to all of the staff who relied heavily on his leadership.

Special commendation should be given the staff who forever seemed to be setting new precedents in their work. Long hours, demanding schedules, and countless frustrations only seemed to kindle new efforts on the part of:

Richard Gebhart, Curriculum Specialist
William Daehling, Media Specialist
John Zuerlein, Media Specialist
Harry Olstad, Supervisor, Participating Teachers
Lorry Sedgwick, Director, Pilot Teacher Education Program
Harlyn Misfeldt, Coordinator, Professional Teacher Education
Douglas Stallsmith, Content Specialist
Charles Yost, Content Specialist
Dwight Davis, Assistant Curriculum Specialist
George Halston, Technical Writer
Ann Wilson, Technical Writer

Any curriculum effort, no matter how well designed, depends for its success on the way in which it is presented to the students. The teachers who participated in the project by teaching American Industry made themselves and their students available as a testing ground of the concept and the materials. They provided countless suggestions for improvement and entered into the project with the same sense of proprietorship as the project staff. Appreciation and recognition of their contributions are extended to:

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Abstract

Part I: Overview of the Project

The American Industry Project represents one attempt to resolve the problem of providing career orientation for young people in a way which would avoid premature tracking; help youth to identify the numerous career options open to them; furnish base knowledges and coping strategies which would help youth to be adaptable to change; and establish a delivery system for teachers of the new program.

Project efforts were aimed to meet the following objectives:

Objective A: To complete the development of an articulated program of American Industry at three levels leading into vocational preparation.

Objective B: To establish, at Stout State University, a resource center for the program of American Industry.

Objective C: To complete the preparation of teaching materials for the upper two levels of American Industry and refinement of the first year's materials.

Objective D: To carry on a series of institutes for the preparation of in-service teachers who will introduce the program of American Industry into their schools.

Objective E: To carry on a pilot teacher education program culminating in a recommended curriculum for the undergraduate preparation of teachers of American Industry.

Objective F: To identify research problems associated with the development and the implementation of the articulated levels of American Industry and to encourage research action seeking answers to these problems.

Impacts of the project effort on the institution included significant changes in the structure of the university; namely changes in departmental organization in the School of Industry and Technology and the implementation of a Center for Improvement of Learning and Instruction as a mechanism for introducing innovation. Significant growth was also noted in the personnel involved in the project.

American Industry

Part I

Overview of the Project

by

Eugene R. F. Flug
Director
American Industry Project

CHAPTER I

ACHIEVING THE OBJECTIVES OF THE PROJECT

Introduction

This volume of the report consists of two parts. Part I offers a narrative overview of the total project in addressing itself specifically to the achievement of the objectives of the project as stated in the original proposal. Part II presents analyses of the data collected and a description of the evaluation process used in developing and testing the curriculum materials. Each part may be read separately to gain different perspectives of the work. It should be noted that common references are made to other papers, reports, and forms which have been bound separately in an appendix to make for easier use by the reader.

The American Industry Project represents one attempt to resolve the problem of providing career orientation for young people in a way which would avoid premature tracking; help youth to identify the numerous career options open to them; furnish base knowledges and coping strategies which would help youth to be adaptable to change; and establish a delivery system for teachers of the new program. (See Appendix P for the transcript of a more detailed presentation of the rationale underlying the project.)

The Objectives of the Project

Objective A: To complete the development of an articulated program of American Industry at three levels leading into vocational preparation.

One year of development had been completed under a grant from the Ford Foundation prior to federal funding. In that time ten secondary school teachers had participated in a summer's work where they wrestled with the task of stating objectives, developing learning activities for each objective, and suggesting resource materials for the teacher. These teacher developed materials were put together into fourteen volumes for use by each teacher in designing his own course of study. Conferences during the year provided for enough interchange to demonstrate that success was mixed and problems were manifold. Federal funding made it possible to gather a staff to carry on a more orderly and continuing development of materials and design a model program to be implemented by all of our cooperating teachers. (A more definitive presentation of the development of materials may be seen in Appendix D.)

A very real setback was experienced in the transition to federal funding. Although we had been informed that the project would be funded under section 4C of the Vocational Education Act of 1963, there was a significant delay in contracting. A preliminary letter of credit authorized expenditure of a minimum amount of funds. However, it was November before we received a contract, thus it was necessary for the university to reluctantly permit us to employ the additional staff needed before the contract had been received. This greatly limited the time available to recruit staff who would be able to step right into a productive role of curriculum building. We were fortunate in locating people who were eager to learn and not afraid of hard work.

While some progress was made in the first year, considerable time was consumed in orienting new staff to their tasks and generally gearing up to a new level of operation. Also, had we been free to offer premium salaries to experienced professionals, we might have been able to reduce our start up time.

A conscious decision was made midway through the project to concentrate our attention on the first level course in the program. Since this was the first contact students would have with American Industry, we felt it deserved this emphasis. The first level was aimed to develop an initial frame of reference, or global construct, of American Industry and it was realized, that for many students, it might be their only exposure. It was felt to be important that this level represent the best we could produce with the time and the funds available.

Materials were produced and tested at all three levels, but it was possible for us to pilot all three levels together in only one school. We have produced enough evidence, however, to feel that the basic approach is sound and could provide an excellent route to vocational preparation. There is some indication that the first level course alone provides a good base for vocational choice for some young people. Consequently, the third level course, which incorporates independent research within one of the major concept areas, might provide a particularly appropriate step toward the four year degree program for those so inclined.

Objective B: To establish, at Stout State University, a resource center for the program of American Industry.

The primary purpose for the inclusion of this objective was to provide for the immediate availability of resource materials which could be of use in the day-to-day tasks of curriculum development. A few sets of multiple copies of certain basic references were acquired for use with workshops and summer institutes. Both content and process references were collected. It was found that there were no comprehensive resources concerned with industry as conceived by the project staff, so efforts were made to search by the thirteen concept areas represented in our knowledge structure. (See Figure 3 in Appendix B-5 for the conceptual structure derived in the study.)

A continuing search was also conducted in our campus library and suggestions for new acquisitions were supplied by project staff to build up the main library in these concept areas.

Within the project resource center, special emphasis was placed upon acquiring those materials not normally available through our campus library. These included some curriculum packages, audio tapes, filmstrips, specialized journals, and numerous house publications from industry and newsletters from various agencies and projects. A valuable aspect of the resource center was its organization around the thirteen concept areas. Much time was saved thereby in accessing materials. Over five thousand separate pieces have been catalogued and used.

Assistance was provided by library staff in all phases of the development of the resource center. The university is moving to consolidate its library and audio-visual services into a learning resource center. A newly established educational curriculum materials center may eventually become the repository for the American Industry resource center.

Because of its unique organization about the thirteen concept areas, the resource center has also come to be utilized rather extensively by students in the American Industry undergraduate degree program and in the graduate concentration in American Industry.

Objective C: To complete the preparation of teaching materials for the upper two levels of American Industry and refinement of the first year's materials.

At the completion of the project, the first level materials had undergone three cycles of develop-tryout-revise, and were considered ready for dissemination. This instructional package consisted of an instructor's guide, film catalog, fifty-two overhead transparencies, a set of transparency masters, three slide series, one filmstrip, and a set of seven student booklets. The package is not included as a part of this report because arrangements have been made for a joint copyright with the Office of Education, and a publisher is being sought for commercial distribution. One complete set is being furnished separately from this report as an exhibit for the informational use of the Office of Education staff.

A twenty minute sound color film entitled, "Introduction to American Industry", was produced entirely with university funds by the Audio-Visual Department at Stout and is an integral part of several activities in the course.

We were unable to carry through the refinement of the advanced course materials for levels II and III as we had hoped since the funding necessary to accomplish this task was not available. Plans are presently being implemented to continue the developmental work within the School of Industry and Technology at Stout. Single exhibit copies of these materials are also being submitted along with this report. Level II and III instructor guides will become a part of the total package to be copyrighted.

It is important to point out here that the university provided most generous support for this project, substantially exceeding minimum required matching funds.

Objective D: To carry on a series of institutes for the preparation of in-service teachers who will introduce the program of American Industry into their schools.

In the first two years of federal funding, participating teachers were brought onto the campus to revise and develop materials for the following year. New teachers were added in each of the two years as we tried to get the representation of schools we desired for pilot testing the materials. It was necessary, because of restricted funds in the last two years, to shift to other means of preparing new teachers. A selected few participating teachers were employed to work on revising materials or to assist in preparing new teachers through the regular graduate program. Also, the Education Professions Development Act made it possible to hold two successive institutes as a part of our dissemination strategy. It was not possible, however, to involve these new teachers as fully in the project as were the participating teachers.

Extension courses were developed and are now being deployed about the state during the regular academic year.

Objective E: To carry on a pilot teacher education program culminating in a recommended curriculum for the undergraduate preparation of teachers of American Industry.

The assignment to fulfill this objective was made to Dr. Lorry Sedgwick, who was employed in the first year of the project under federal funds. In discussions with President Micheels, we were urged to free our thinking and look for new solutions without restriction to established forms. Accordingly, Dr. Sedgwick spent the better part of the first year in building a model of the effective teacher as supported by research or a significant body of opinion. (Appendix Q presents the Teacher Model used to guide the development of the teacher education program.)

The essential characteristics of the four year degree program were its breadth of course experiences, the early introduction to teaching, and the integration of professional teacher education content into the total four year program. (Dr. Sedgwick's paper describing the program is shown in Appendix R, and the competencies expected are listed in Appendix S.) Recognition for outstanding achievement in innovative teacher education programs was given Stout for the American Industry program by the American Association of Colleges for Teacher Education in 1968.

The American Industry degree program was accepted as a regular offering of the university well before the termination of the federal funding period. (Appendix T shows the degree requirements for the American Industry major. The requirements for a dual major in American Industry/Industrial Arts are shown in Appendix U.)

Objective F: To identify research problems associated with the development and the implementation of the articulated levels of American Industry and to encourage research action seeking answers to these problems.

Achievement of this objective was a natural concomitant of the ongoing project. The teachers participating in the project involved themselves in graduate degree programs and availed themselves of the opportunity to complete the research requirements with American Industry problems. One participant completed his doctor's degree and is now teaching at a major university, and another will soon complete his doctorate. Four project staff members also completed their doctorates, incorporating work on American Industry problems. Numerous graduate students not directly involved in the work also produced related research. In many cases related research was conducted by those who visited the project at Stout or observed the field centers.

Spinoff activities of many kinds resulted from project efforts. One important contribution was the introduction of micro-teaching to the Upper Midwest by project staff. (See Harlyn Misfeldt's paper in Appendix V.) Another was the establishment of the Center for Improvement of Learning and Instruction with the general responsibility of introducing and enabling innovation on campus. Growing interest in career education also makes it likely that a Center for Vocational Education will be established at Stout through joint action of the university and the Wisconsin Board for Vocational, Technical and Adult Education.

CHAPTER II

EFFECTS OF THE AMERICAN INDUSTRY PROJECT UPON THE INSTITUTION

Introduction

The American Industry Project was the first large scale, federally funded project implemented in the Wisconsin State University System. It also marked the first significant venture for Stout State University into research and development. This effort was launched at the outset of one of the greatest growth periods in the history of both system and institution. Under these conditions one might expect that many decisions would need to be made without benefit of precedent. Many difficulties were encountered in attempting to perform functions for which university procedures had not been designed. To chronicle these problems would be worthy of a major work in itself but, in retrospect, it must be admitted that the project created a host of new problems for harried administrators who were overburdened and understaffed. The fact that difficulties were surmounted and positive effects resulted is the focus of this chapter.

Influences on Program

Perhaps the most significant institutional impact of the American Industry Project was bringing the status quo under searching scrutiny. Stout had long been a leader in industrial arts education, graduating more students in that field than any other university in the country. There is a natural tendency when dealing with relatively large numbers of students, to move cautiously in making curriculum changes because of the administrative readjustments necessary. Perhaps even more important, are the attitudinal problems behind the difficulty of shifting an orientation based in a long and proud tradition. The American Industry Project, with a mandate to find new solutions to career education problems, called into question not only existing practices, but the very bases on which they were predicated.

Earnest efforts were made by the project staff to develop understanding and acceptance by sharing information and ideas with the university community. For many faculty, however, the new views were too radical a departure to accept. Skepticism and even outright resistance were not uncommon amoung the early attitudes faced. Consequently, it was much easier for project staff to focus on the challenges implicit in the curriculum tasks under way than to devote efforts toward cultivating scoffers and obstructionists. A common observation among project staff in the second year of the project was "People are more receptive to American Industry the farther away we get from Stout."

This early management error was rectified in the third year with increasing attempts to involve university personnel in activities related to the project. Faculty were asked to critically evaluate materials and to visit participating centers. Key staff were invited into workshops with participating teachers and other faculty were asked to contribute to the dialogue generated in the professional teacher education's new interdisciplinary seminar. These and other efforts stimulated new discussions of philosophical positions and ultimately resulted in the establishment of the dual major in American Industry/Industrial Arts. (See Appendix U)

The turning point in legitimizing American Industry on the campus came with the support of Dean Herbert Anderson of the School of Industry and Technology. Evaluation of the substance of the American Industry program persuaded him of the promise inherent in the conceptual approach. Under his steady, determined leadership it is expected that American Industry will grow in influence and acceptance. This is not to say that all aspects of the program now meet with complete acceptance. On the contrary, criticism is still evident but it has shifted to a healthy focus on implementation and one finds that the questioning now includes ways in which campus programs can assimilate the best ideas of both innovation and tradition. Several basic courses of the American Industry program at the university level have been accepted as requirements for all incoming freshmen in the industrial arts program. A movement is under way to insure that all future industrial arts graduates of Stout will be capable of teaching at least the first level of American Industry in the intermediate and secondary schools.

Influences on University Structure and Personnel

Consideration of the American Industry Project's conceptual analysis of the knowledges of industry have led the School of Industry and Technology at Stout to accept responsibilty for maintaining the currency of that structure. The structure is expected to serve as the basis for curriculum development within that school. Acceptance of the conceptual orientation has led to a re-examination of the departmental structure and consideration is now being given to reorganizing the departments. The reorganization is aimed to better affix responsibility for concept areas embodied in the knowledge structure.

Several years ago mention was made to the writer by an official of a major funding agency, that few of the projects they had funded had had much of an effect on existing practices. The most visible effect of their funding was to be seen in the professional and personal growth of the staff involved in the projects. This kind of growth was also seen in American Industry Project staff.

Dr. Face, one of the original co-directors of the project was appointed at the end of the project's second year, to half time responsibility as Assistant Dean of the Graduate School. In the fourth year he was appointed full time to Assistant to the Vice President for Academic Affairs and Curriculum Coordinator. At that time the writer was named Assistant to the President and Director of the Center for Improvement of Learning and Instruction, with responsibility for introducing innovation into the university. Dr. Nelson, Research Specialist on the project, has moved into a key role in the Center of providing research and evaluation consultation to the university and to the state vocational system. Harlyn Misfeldt, Coordinator of Professional Teacher Education on the project was recently elected to a similar position within the School of Education. Dr. Sedgwick, Director of the project's professional teacher education program provides leadership and consultation on individualized instruction as a staff member of the School of Education.

William Daehling, Audio-Visual Specialist on the project left to complete his doctorate and is now a dean at Weber College, Utah. Richard Gebhart, Curriculum Specialist on the project, also completed his doctorate and is now on the staff of the Industrial Education Department. He is soon to initiate a statewide study of industrial arts funded by the Department of Public Instruction. Harold Olstad, Supervisor of Participating Teachers, has been re-assigned as Program Director of the American Industry major and is responsible for the continuing development of the campus based program.

Douglas Stallsmith and Charles Yost, Content Specialists in American Industry provide leadership in the School of Industry and Technology in the development of conceptually oriented laboratory courses. Mr. Stallsmith has also been called upon as a consultant to school systems in the design of flexible laboratories for industrial arts and related areas. All of the above have contributed to the design of the facilities to house the Center for Improvement of Learning and Instruction.

Dwight Davis served for two years as Assistant to the Curriculum Specialist while a student at Stout. He has since completed advanced degree work and is Associate Dean for Curriculum at Joliet Junior College in Illinois. He is providing state and regional leadership in the development and testing of the comprehensive Joliet Curriculum Development Model funded by the state of Illinois. Other participants and students associated with the project in different ways have continued to show growth in their respective pursuits.

The Center for Improvement of Learning and Instruction

The opportunities for institutional growth which came to the university as a result of the American Industry Project, were recognized early. The writer was very much concerned that some means be found to provide for continuing this growth and increasing flexibility beyond the duration of the project. Consequently, a proposal was accepted by the President to incorporate into the university structure a unit which would serve as a mechanism for change. The Center for Improvement of Learning and Instruction was designed for the primary purpose of providing an outlet for faculty, staff, and student ideas which hold promise for improving university efforts to achieve the university's mission. Its emphasis is to be on applied problems in instruction, research, or service and it is intended to serve the entire university.

The Center is intended "to get things started" and carried to the point where the new practice is being accepted into ongoing programs. Its operation is seen as one wherein there is the willingness to try, to risk failure, to honestly say that the university encourages new thinking about the tasks that face us. The willingness to question the validity of the status quo in an effort to find better solutions is basic to its function. The Center is attached to the President's office because of its all-university function and can provide a vehicle for launching actions which the president deems in the best interests of the university in moving toward the achievement of long range goals.

Two advisory groups are to be formed to guide the involvements of the Center. The first, representative in nature, is to aid in the formulation of policy and evaluation of operations of the Center. The second advisory group will be selected according to competence and interest in promoting improvement. When appropriate, this latter group will be called together to consider ideas presented by faculty or students. Its function will be to suggest improvements in the proposal and plans for proceeding by providing unbiased, constructive criticism.

Key features of the Center's operation involve provision of consultative assistance, clerical support, facilities and released time. Unassigned allocations are being sought so that faculty may be freed to work on projects supported by the Center. Office space and laboratory facilities will be made available as needed.

In September of 1972 the Center will become a functioning reality on Stout's campus. Figures 1 and 2 on the following pages shows the layout of facilities being constructed within the new Applied Arts building. About 22,000 square feet has been assigned to the Center. The American Industry laboratory is intended to provide the utmost in flexibility as a demonstration of a model American Industry facility. Complete services including water, electricity, air pressure, vacuum lines and exhaust system are supplied from overhead. Equipment will be mounted on air pallets which, when hooked up to an air pressure line, will enable one to easily move the heaviest piece of equipment. This laboratory will provide ongoing instruction in American Industry but will also provide for pilot testing new configurations of equipment designed to optimize technical instruction. Two storage rooms, a finishing room, and a dark room are integral parts of this 5000 square foot laboratory.

Adjacent to the American Industry laboratory is the Learning Research Laboratory. Staff from the School of Education will utilize this facility for research in teaching methodology. Provisions for flexibility in this area include an overhead grid system which will make it possible to divide the approximately 2200 square feet into modules of a great variety of sizes. Provisions can be made to enclose individualized learning areas and small group or large group areas by shifting movable panels which fit into the overhead grid system. The laboratory will be furnished with equipment which will make it possible to study a variety of applications of media to instruction.

The third laboratory, of about 2400 square feet, houses equipment which will make it possible to fabricate new designs of equipment for technical instruction. As equipment is developed it will be tested under instructional conditions in the adjacent laboratories. Flexibility is provided in this area through the use of a computer floor consisting of panels under which electrical and other services are provided to each panel. A concrete apron for heavier equipment surrounds the computer floor area. Supporting facilities for the laboratories include a seminar room, a media design and production area, a dark room, a clean drafting room for engineering artwork, a normal design and drafting room, and a large storage room.

The remainder of the area assigned to the Center includes 17 offices, a small conference room, a stenographic pool, a storage and duplicating area, and an information processing and retrieval area. Three remote access computer terminals will be tied into our centralized computer facilities. A lounge area completes the complex.

While there may be some question about broad-scale acceptance of the American Industry program in the intermediate and secondary schools there is no doubt that the effects on individuals involved have been considerable and that the impact on the institution has been pervasive and will prove to be long lasting.

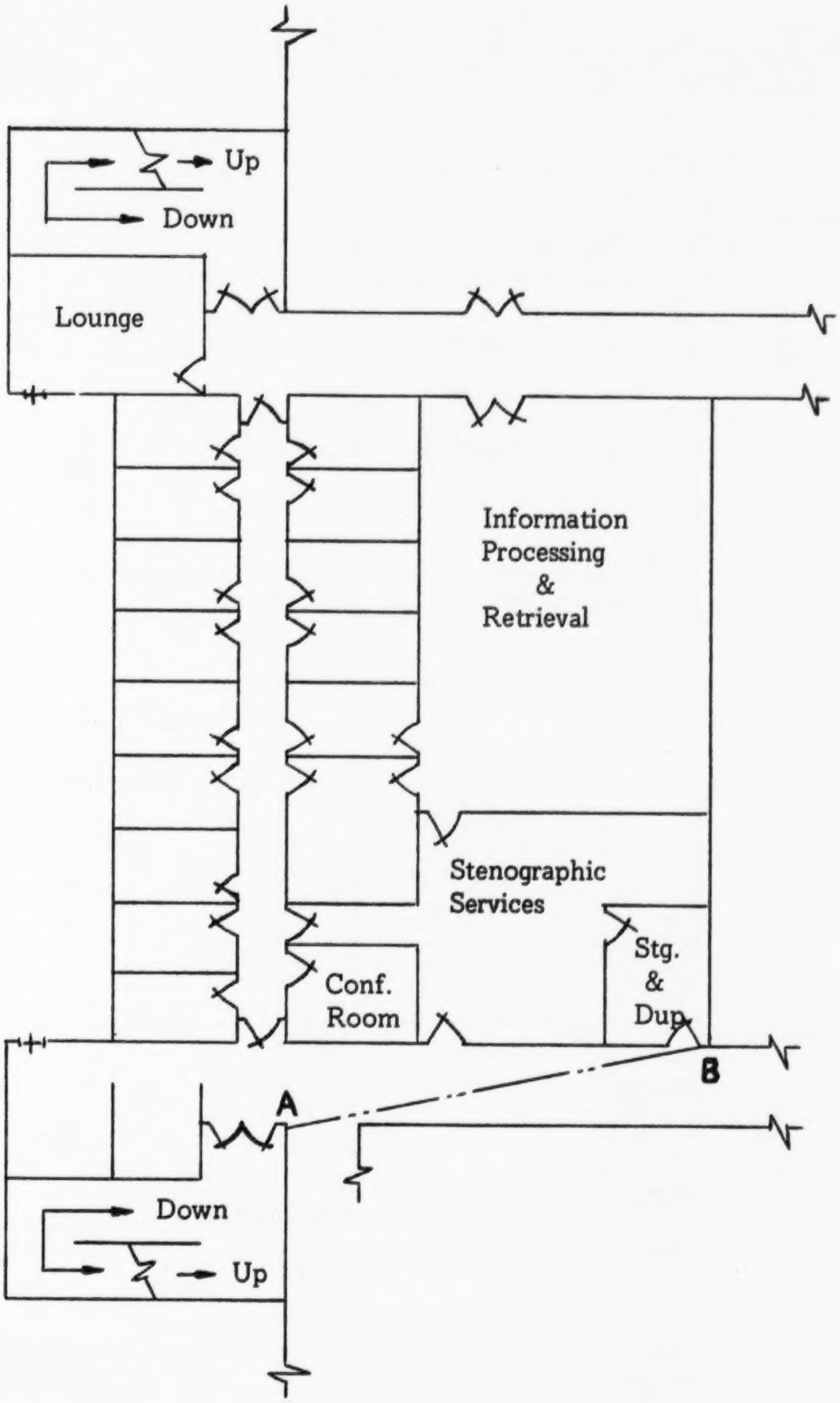
Up
Down
Lounge
Information Processing & Retrieval
Stenographic Services
Stg. & Dup.
Conf. Room
A
B
Down
Up

Figure 2

Center For Improvement Of Learning And Instruction
Office Complex

1.8 a

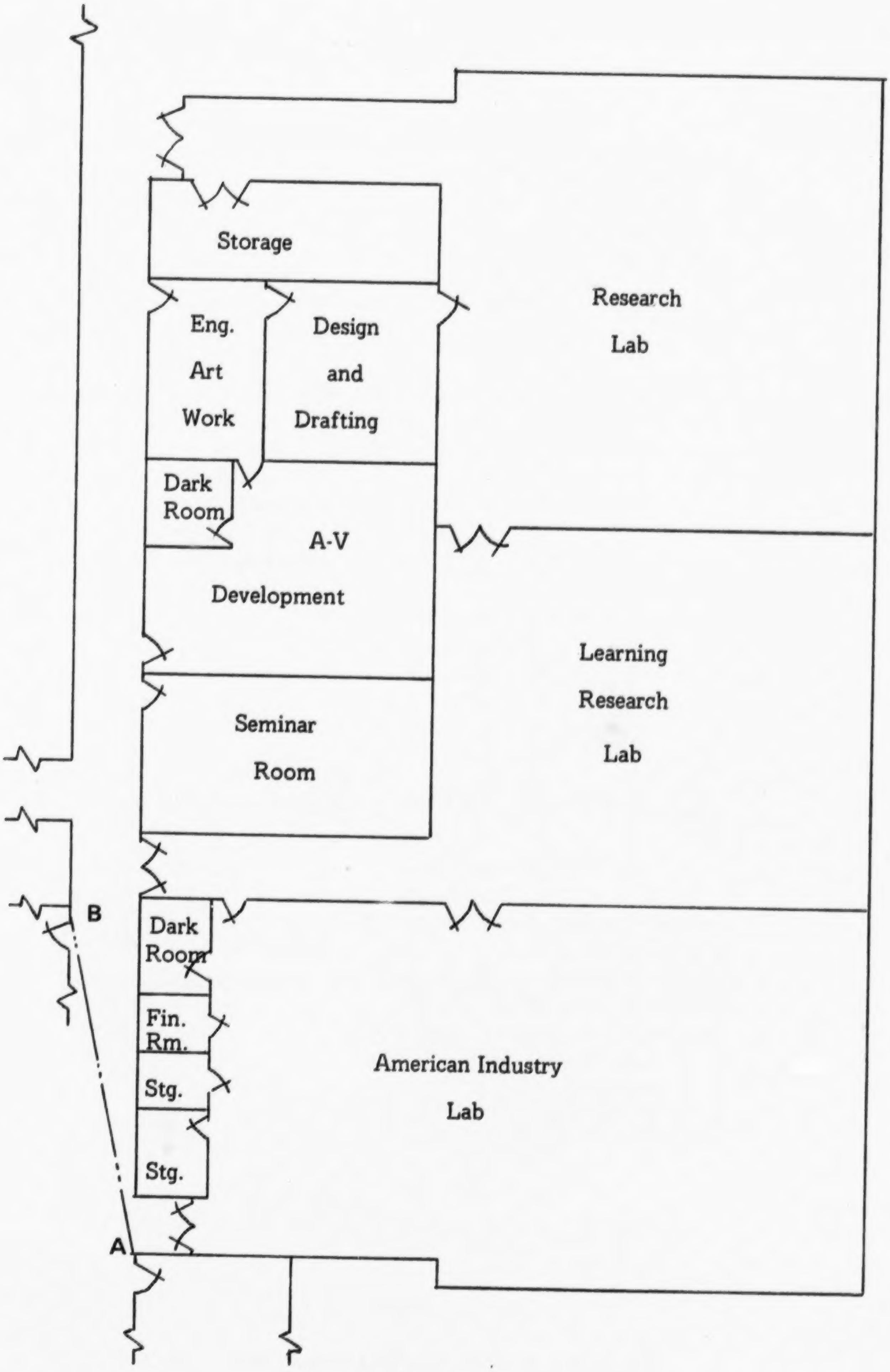
Storage
Research Lab
Eng. Art Work
Design and Drafting
Dark Room
A-V Development
Seminar Room
Learning Research Lab
B
Dark Room
Fin. Rm.
Stg.
Stg.
American Industry Lab
A

Figure 1

Center For Improvement Of Learning And Instruction Laboratories

Abstract

Part II: Development, Implementation, and Evaluation of American Industry Secondary School Courses

The American Industry Project grew out of the concern of a group of Stout State University professors for the status of industrial arts and its future goals. The efforts and ideas of these men provided the basis for systematic development of the American Industry curriculum. Their decision to isolate the conceptual knowledges of industry and structure them in a logical manner was a key element in the design of this curriculum.

Data for the conceptual structure were obtained from written documents, interviews with people in industry and observation of industrial activities. The resulting structure was validated with a jury composed of educators and men in industry. It was the opinion of the jury that the structure of conceptual knowledges was logical and representative of the knowledges used in industry.

Three secondary school courses based on this structure were designed and developed. The first course, Level I, was based on the major concepts in the structure. Level II, the second course in the sequence, was designed to go into greater depth through the study of selected sub-concepts in the structure. The last course, Level III, was developed to give the student an opportunity to select a problem and apply the concepts in the structure to it.

The majority of the American Industry Project's data came from the experimental tryout of the Level I course. Time, budget, and student scheduling limitations reduced the amount of experience the Project had with Levels II and III. however, the results of the evaluation of Level I provides considerable information for refining Level I and revising Levels II and III.

Analysis of the data collected from the Project's achievement test revealed that approximately 40% of the American Industry Classes taught by instructors who followed the Project's instructor's guide or used its objectives and content to at least a moderate degree achieved significantly higher scores than the students in the control group. In an additional 12.5% of the comparisons, the F value approached significance with the American Industry students outscoring their counterparts in the control groups. In no comparison was there a significant difference in favor of the control group, and in only one of approximately sixty comparisons did the mean for the control group exceed the mean for the American Industry group.

In a study of interests and attitudes conducted during the 1967-68 school year, the responses of the American Industry students gave evidence of a more positive attitude toward industry than those of the control group. Also, their responses indicated that the study of American Industry had an impact on their knowledge of occupational opportunities in industry and their interest in working in industry. A small-scale follow-up study with graduates who had taken the Level I American Industry course reinforced these findings.

The results of the evaluation indicated that the study of American Industry had a measurable impact on the students' knowledge of industry and their interests in it. Data collected during the evaluation also gave a clear picture of the operating characteristics of the instructional materials developed for the courses.

O. Nelson
August 25, 1971

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4. Appendix O: Instrument and key used to collect and analyze data on student attitudes.

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American Industry

Part II

Development, Implementation, and Evaluation of American Industry Secondary School Courses

by

Orville Nelson
Research Specialist
American Industry Project

CHAPTER I

DEVELOPING AND EVALUATING THE AMERICAN INDUSTRY SECONDARY SCHOOL CURRICULUM

Introduction

The contents of this report pertain to the activities undertaken to develop, refine, and evaluate the American Industry secondary school curriculum. In the first part of this report which encompasses Chapters I, II, III, the reader will find a general presentation of the results of the American Industry evaluation. This presentation includes a brief history of the American Industry Project; a description of the American Industry secondary school curriculum, and a discussion of the evaluation results.

In-depth reports of specific curriculum development and evaluation activities are presented in the appendixes. Readers interested in detailed and theoretical discussions should review the reports in the appendixes. Reference will be made to these reports in Chapters I, II, and III as they pertain to the topics under discussion.

Genesis of the American Industry Project

Man is continually seeking new methods and means to satisfy his basic needs and desires. This quest is reflected in our ever changing technology. Human muscle power is being replaced by chemical, electrical, and atomic energy. The craftsman ha many fields, been replaced by specialists and by specialized machinery. Man has become more and more dependent upon others for the products he has to have to satisfy his needs. These are but a few examples of the changes being brought about by man's search for greater productivity.

The factors just noted have special importance for educational programs related to industry. With rapid changes in industry it is imperative that a curriculum such as industrial arts be updated to keep pace with the real world phenomena upon which it is based. This was the problem that stimulated a group of professors at Stout State University to form a study group in 1962 to review the content and direction of industrial arts. Out of their discussions and study grew the realization that there was a need for change in the industrial arts curriculum of the era.

This study group made two major decisions in relation to the nature of the revised curriculum for industrial arts that were to have a significant impact on ensuing activities. First, it was decided that the study of industry was to be the central objective. Second, it was concluded that the revised curriculum should provide an efficient and effective way to present the myriad of knowledges and skills utilized by industry. The first decision led the group to distill a definition of industry that would guide the ensuing activities. The second decision stimulated the development of a conceptual structure of the knowledges used in industry. More information will be presented on this structure in the section that follows.

Early in 1964, Stout received a small grant from USOE (Cooperative Research Project No. S-068.) This grant provided the opportunity for concentrated effort on the initial distillation of the conceptual structure and planning the development of the secondary school curriculum.

In the summer of 1964, Stout received a one year grant from the Ford Foundation. This grant supplied the resources needed to develop the initial set of instructional materials and provide in-service training for ten high school industrial arts teachers. During the following academic year, these ten teachers tried out the materials and the curriculum in their schools. The positive response in this phase encouraged the Project staff to request a long-term grant from the USOE.

In July, 1965, Stout State University started on a four year grant from the USOE (USOE Contract No. OE–5–85–060). This grant enabled the American Industry Project to expand to twenty participating teachers and seven full time university staff members. The secondary school curriculum development and evaluation activities financed by this grant are the basis for this part of the report.

Development of the American Industry Conceptual Structure of the Knowledges Necessary to Understand Industry

Work on the American Industry structure spanned all of the phases of the Project described in the previous section. No specific attempt will be made to allocate individual developments to any one phase. Instead, an attempt will be made to capture the thinking and the procedure involved in the flow of activities employed to build the structure.

As noted previously, an initial step in the development of American Industry was the definition of industry. This definition delimited the field of study and the attributes in the definition helped to guide the development of the curriculum materials. In its final form, the definition read "industry is an institution in our society which, intending to make a monetary profit, applies knowledge and utilizes natural and human resources to produce goods or services to meet the needs needs of man". (attributes are underlined) This statement included one major change from the definition initially developed by the study group. After a number of discussions with people in industry, the attribute of profit was added.

During the time the original faculty group was meeting, the ideas of structure and conceptual learning were coming into prominence in education. Such writers as Bruner and Phenix were stressing the importance of structure to efficient and effective learning and understanding. Bruner was probably the best known advocate of concept learning at that point in time. The thoughts and writings of these two men and several psychologists provided the ingredients for the solution to the problem of how to assemble the numerous knowledges related to industry in an efficient and flexible manner. The solution was to develop a conceptual structure that represented these knowledges. The working definition of concept employed by the Project was:

> A concept is a psychological construct resulting from a variety of experiences (detached from the many situations giving rise to it), fixed by a word or other symbol having functional value to the individual in his thinking and behavior (Face and Flug).

Structure was viewed as the manner in which the concepts were related.

Using the concept as the unit of analysis, a variety of business enterprises falling within the scope of the Project's definition of industry were scrutinized to determine the major concepts employed. Information was obtained from literature related to these businesses, from interviews with people functioning at various levels in representative firms, and from professors of industrial management and business administration. This procedure was repeated during three revisions of the structure. In addition, the process of developing instructional material provided another check, especially on the validity of the structure. The development of learning hierarchies and instructional sequences furnished a detailed check on the relationships posited in the structure. A graphic summary of the result of these activities is given in Figure I. A more complete description of the procedures employed to delineate the structure is presented in Appendix D.

American Industry Secondary School Instructional System

One of the major tasks financed by the last USOE grant was the development of a secondary school program in American Industry. Successful completion of this task was contingent on being able to work effectively with secondary school staff members and the capability to produce instructional materials that were appropriate for the environment in which they would be used. An additional constraint was that the materials had to be valid in relation to the Project's conceptual structure.

In designing the instructional materials, consideration was given to the instructional system utilized in the secondary schools. Major components of this system were the students, teachers, instructional materials, and the school environment. Once a school was selected, the nature of the students was to a large degree fixed. Some changes could be made in their interests but this had to be accomplished through the teachers and the instructional materials. Likewise, the school environment was relatively fixed. There may have been some money in the budget for new equipment and facilities but, for the most part, only minor changes were possible in this component. Thus, the only two variables open to significant variation were the teacher and the instructional materials. However, the teachers could not be completely retrained. A limited amount of time and resources were available for in-service workshops and institutes. Considering the number of new content areas and instructional methods required, the time and resources were not adequate for optimizing the teacher variable.

After the characteristics and limits of the other three variables were determined, the only remaining variable open to extensive manipulation was instructional materials. As a result, the decision was made to put as much effort as possible into the development of these materials and

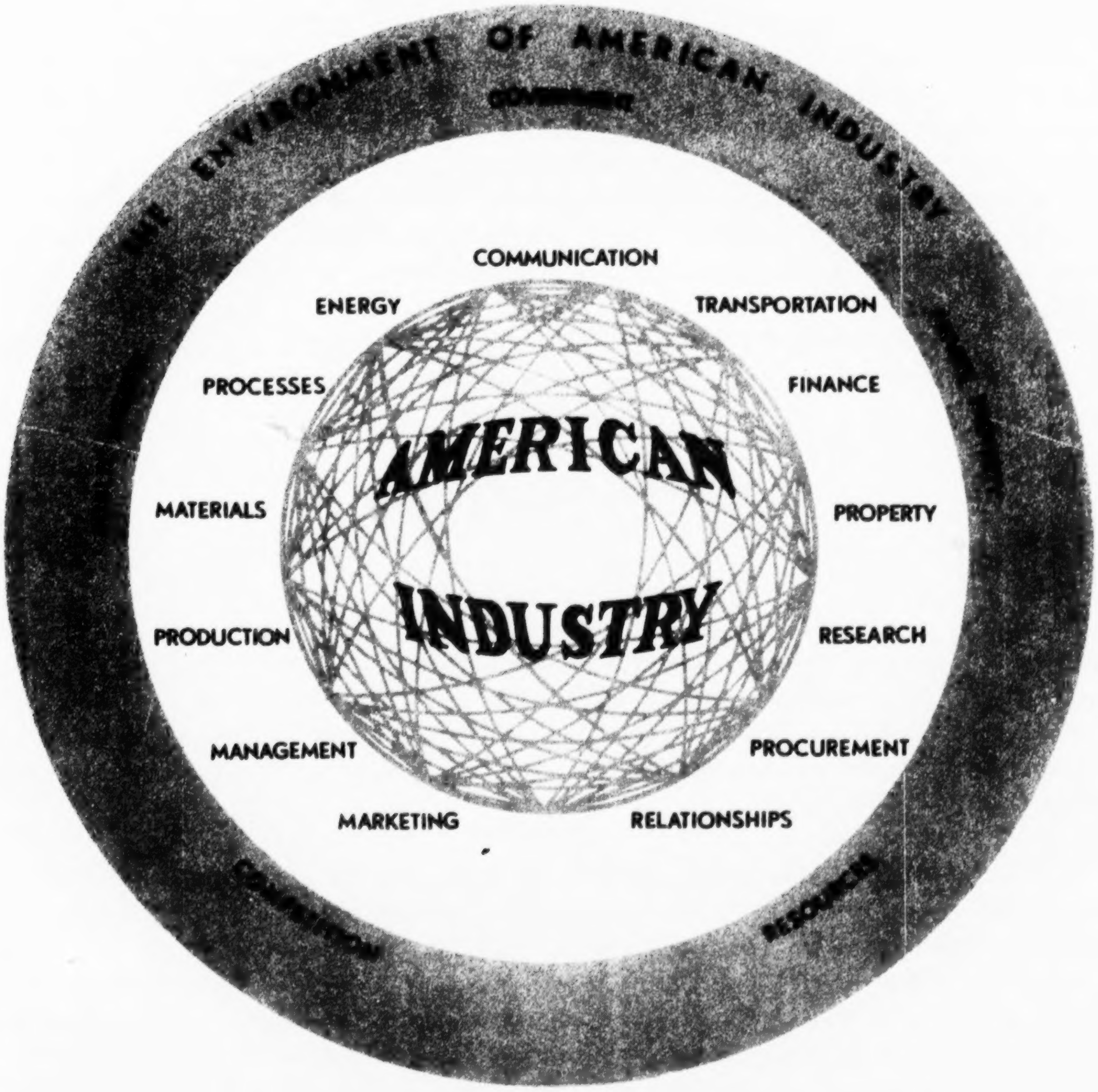

THE ENVIRONMENT OF AMERICAN INDUSTRY
GOVERNMENT
COMMUNICATION
ENERGY
TRANSPORTATION
PROCESSES
FINANCE
AMERICAN
MATERIALS
PROPERTY
INDUSTRY
PRODUCTION
RESEARCH
MANAGEMENT
PROCUREMENT
MARKETING
RELATIONSHIPS
COMPETITION
RESOURCES

Fig. 1

*A CONCEPTUAL STRUCTURE
OF THE KNOWLEDGES NECESSARY
TO UNDERSTAND AMERICAN INDUSTRY*

to design them to fit the existing secondary school instructional system. Thus for example, the instructor's guide for Level I was rewritten with greater detail. On the basis of the experiences with the original set of instructional materials, the first level guide was enlarged in order to present a more detailed suggested sequence of instruction and provide the teacher with content in the concept areas in which he was not familiar. Also, the media specialist designed most of the visual media for the overhead projector since it was more accessible to the teachers than other projection equipment. Moreover, overhead transparencies proved to be more flexible than other media. For instance, comments could be placed on a transparency by the instructor and he could quickly select one or more transparencies from his file to introduce a new topic or review one that had been discussed on a previous occasion. (See Appendix E for a detailed report on the media development.)

This section has described the context within which the curriculum development activities were undertaken. Further discussion of the secondary materials will be presented in the next section. Additional data on the contents of the materials and their operating characteristics will be presented in the next section and in **Chapter II.**

Developing and Revising Instructional Materials

The conceptual structure of the knowledges of industry constructed by the American Industry Project provided the content and the structure for the design of three secondary school courses. Level I, the first course, was constructed (1) to develop a knowledge and understanding of the major concepts of industry and their relationships, and (2) to develop the ability to solve simple problems related to industry. This course was designed for typical eighth grade students. The major concepts and relationships studied are those on the perimeter of the core and those in the environment. (See Figure I.)

Level II was designed to (1) develop an in-depth understanding of the concepts of industry and a refined comprehension of the relationships among these concepts, and (2) to expand the ability to recognize and solve complex problems related to industry. This course was constructed for ninth or tenth grade students.

Level III was planned for tenth through twelfth grade students. Its general aim was to develop the ability to apply the concepts of industry to specific problems. Problem selection would vary depending on the ability and interests of the student.

These courses were designed to be sequential. A student was expected to take Level I before he could enroll in Level II. Likewise, a student would have Levels I and II before taking Level III. In addition, the Projects funds for the last two years of the grant were reduced as a part of a general reduction in research funds at the Federal level. As a result, most of the Project's evaluation, experience and data were with Level I. Thus, most of the information in the remainder of this report will pertain to this level.

Two of the major forces that influenced the development of the first level course were the Project's conceptual structure and Gagne's work on learning hierarchies (1965). As noted before, the structure and information associated with it provided the content and direction for sequencing the materials in the course. Gagne's ideas were of significant help in establishing instructional sequences and the learning environments that would lead to the development of the concepts in the structure.

Instructional materials for the Level I course include a two-volume instructor's guide, film catalog, fifty-two overhead transparencies, transparency master's, three slide series, one film strip, and a set of seven student booklets. All of these materials were based upon the structure and most of them were processed through a develop-tryout-revise cycle at least twice. The instructor's guide for Level I was revised three times in order to assure that it would function with adequate effectiveness in the secondary school instructional system. If the reader is interested in further details on the development procedures for the instructional materials, appendixes D and E should be reviewed.

Level II and Level III materials were in the first develop-tryout-revise cycle at the end of the Project's four year USOE grant. They will need to be refined in the same manner and submitted to the same evaluation as described for Level I.

The develop-tryout-revise cycle mentioned in the preceding paragraphs leads to the next aspect of the development of the secondary school program - the evaluation system formulated to collect data for decision making. All three phases of the cycle were touched by the evaluation system. Decisions to be considered in the development of the secondary school curriculum provided the context and questions required to guide the design of instruments and data collection. During the develop and tryout phases, information was collected, processed, and stored. Analysis of these data provided the basis for decision making in the revision phase.

American Industry Evaluation System

Curriculum development requires a large variety of decisions. Obviously, the developer wants to know if his materials enhance learning. However, it is also important to know how the materials were used and under what conditions in order to provide a context for interpreting data. The major components of the evaluation system designed for the American Industry Project were three domains and the interactions of these domains. The domains represented the inputs, transformations, and the outputs of the system. They were entitled ingredients, processes, and products respectively. The interactions symbolize the influence of one variable on another. For example, a student's reading ability interacts with the reading level of the instructional materials and influences what he learns from these materials.

The ingredients domain encompasses all of the inputs into the learning situation. Examples of these inputs are the quality of the instructional materials, abilities and interests of the students, characteristics of the participating teachers, and the intellectual climate of the school and the community.

As a course is being taught, a number of instructional processes are applied to and interact with these inputs. Students are exposed to instructional media, activity sheets, and booklets in the American Industry course. Teachers are exposed to new materials and ideas and their associates become aware of a new curriculum. All of these on-going actions and activities are embraced in the processes domain. This domain can generate a continuous flow of vital information during the time the course is in progress. However, it required systematic monitoring and a relatively rapid feedback process. Systematic attention to this information can assist the developer and researcher in helping the teachers correctly apply the educational (experimental) treatment.

The third domain consists of the products or outcomes of the study of American Industry. it is concerned with the skills, abilities, and interests of the student at the end of the course, opinions and impressions of the teachers, reactions by administrators and staff members at the school, impacts on the discipline.

Figure 2 gives a graphic presentation of these domains and illustrates the relationships between them. Examples of data collection procedures and instruments for each domain are presented in the next chapter. A more detailed description of this evaluation system and the principles utilized in designing it are presented in Appendix C. In addition, several of the appendixes contain replicas of instruments utilized in the evaluation.

In order to have a context for interpreting the products, especially student achievement, control groups were established when possible. The scope and history of the American Industry Project did not facilitate the use of a sophisticated sampling plan that would provide a classical experimental research design. Both the Ford Foundation and four year USOE grants came relatively late in successive academic years. In addition, the Ford grant was not given for experimental purposes. At the beginning of the USOE grant there was a committement to ten teachers who were not selected on the basis of a sampling plan. There was also a need to expand the program in some of the original schools in order to make provisions for teaching Levels II and III.

Within these restrictions, there was an opportunity to establish some experimental designs with equivalent control groups. In some instances, these took the form of rotational or crossover designs, however, destroyed the use of the control group for follow-up purposes. Quasi-experimental designs were possible in two of the other schools. One of the two schools in which no comparison group was available served as a tryout center for evaluation instruments.

The experimental designs in the schools varied to some degree each year depending upon class schedules and the students' selection of courses. However, data from previous years provided a baseline for comparisons in some of these situations.

Two additional concerns in the design and management of the evaluation system were the selection of the specific types of data to collect and the data collection schedule. To a considerable degree, the evaluation system helped to specify the data to collect and to some extent indicated a schedule. The type of experimental design also assisted in establishing the data collection schedule. However, another aid in making these decisions was the research and development strategy employed by the Project. Figure 3 depicts the strategy utilized in developing and evaluating learning expedients. The ball at the left symbolizes the basic role the Project's rationale played in each action and decision. Initial tryouts of materials, learning activities, or instructional methods usually do not provide optimum solutions; however, they will provide feedback for further refinements. These results and relationships are indicated by the spiral lines

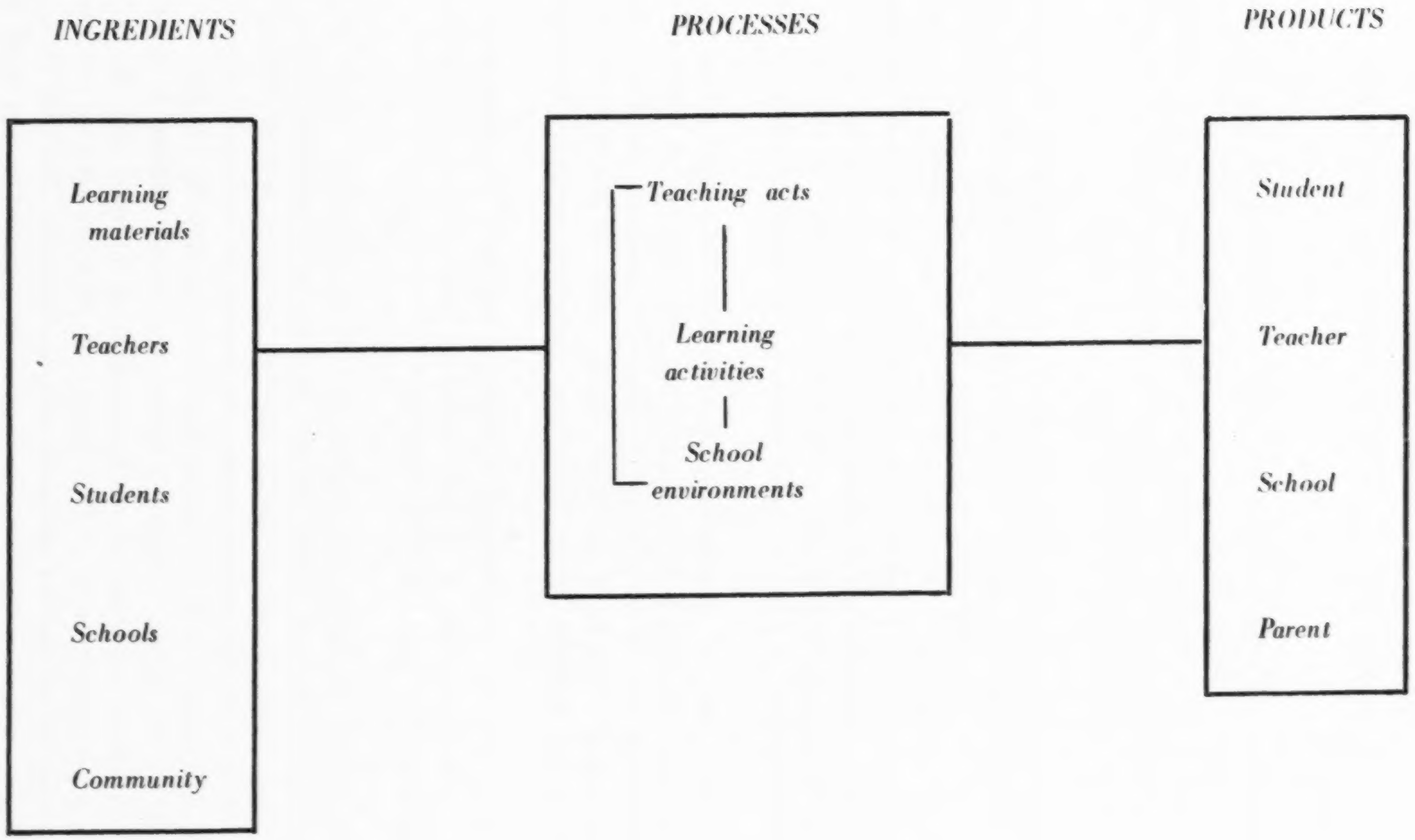

INGREDIENTS
PROCESSES
PRODUCTS
Learning materials
Teachers
Students
Schools
Community
Teaching acts
Learning activities
School environments
Student
Teacher
School
Parent

Fig. 2. Evaluation Domains in the American Industry Project

around the solution axis and the decreasing distance between the two with each succeeding spiral. This strategy was applied at various times to an entire course, a unit in the course, and sub-parts of a unit. Its application depended on the data required in the research and the research priorities established for the Project.

The relationships of the linear distance traversed along the solution axis during each suceeding spiral is denoted by $X > Y > Z$ in Figure 3. In other words, increments of progress become more difficult to achieve with each successive spiral. The first trial identifies obvious areas in which improvements can be made. As these changes are made, smaller and more subtle problems come to the fore-front.

Each spiral along the solution axis contains five distinct segments that represented specific steps in the development and evaluation of the American Industry curriculum. The first step was to state the objectives for the course or segment of instruction in as lucid terms as possible. Once the objectives had been stated learning expedients were selected or developed to meet them. At this point the learning expedients were ready for a tryout in an instructional situation. Data were collected prior to, during, and at the end of the tryout to provide the information for the evaluation. The domains noted previously identified areas in which to develop data collection instruments. Interpretation of the products data was made in relation to the ingredients and processes data as well as in comparison with the performance of the control group.

Upon completion of the evaluation, the research and curriculum specialist on the Project decided whether the objectives were met and if not, the reason(s) for not attaining them. If the decision was made to continue into another cycle, the same five steps were employed again. This process was continued until a satisfactory level of achievement was reached. "Satisfactory" as used in this context does not imply that the instructional materials were perfect. Rather, it means that in relation to the other elements of instruction being developed, the one under consideration had been improved to the point where it was more productive to work with another one. For example, opinionnaire data from students and teachers plus achievement test data indicated that the student enterprise was functioning rather effectively in its initial form. (See Appendix H.) Thus, developmental work was stopped on the enterprise activity and attention was focused on other aspects of the Level I course.

To the degree time and resources permitted, a variety of achievement measures were administered to the American Industry students. (See Appendixes J, K, and L for descriptions of several measures employed.) More than one type was used in order to isolate factual information from rendom error and bias factors present in the data from specific types of measurement techniques. For instance, objective tests allow the evaluator to sample a prescribed set of behaviors but they penalize the nonverbal student. Whereas essay tests allow the student to freely express himself, they suffer from the lack of scope in the behaviors sampled and the objectivity of the scoring process. Observing students in the "normal classroom setting and engaging them in discussion can also help to assess their competencies, but this procedure in itself alters the "normal" classroom situation and is open to rater bias. However, use of the data from all three sources in the analysis can help to identify the true outcomes.

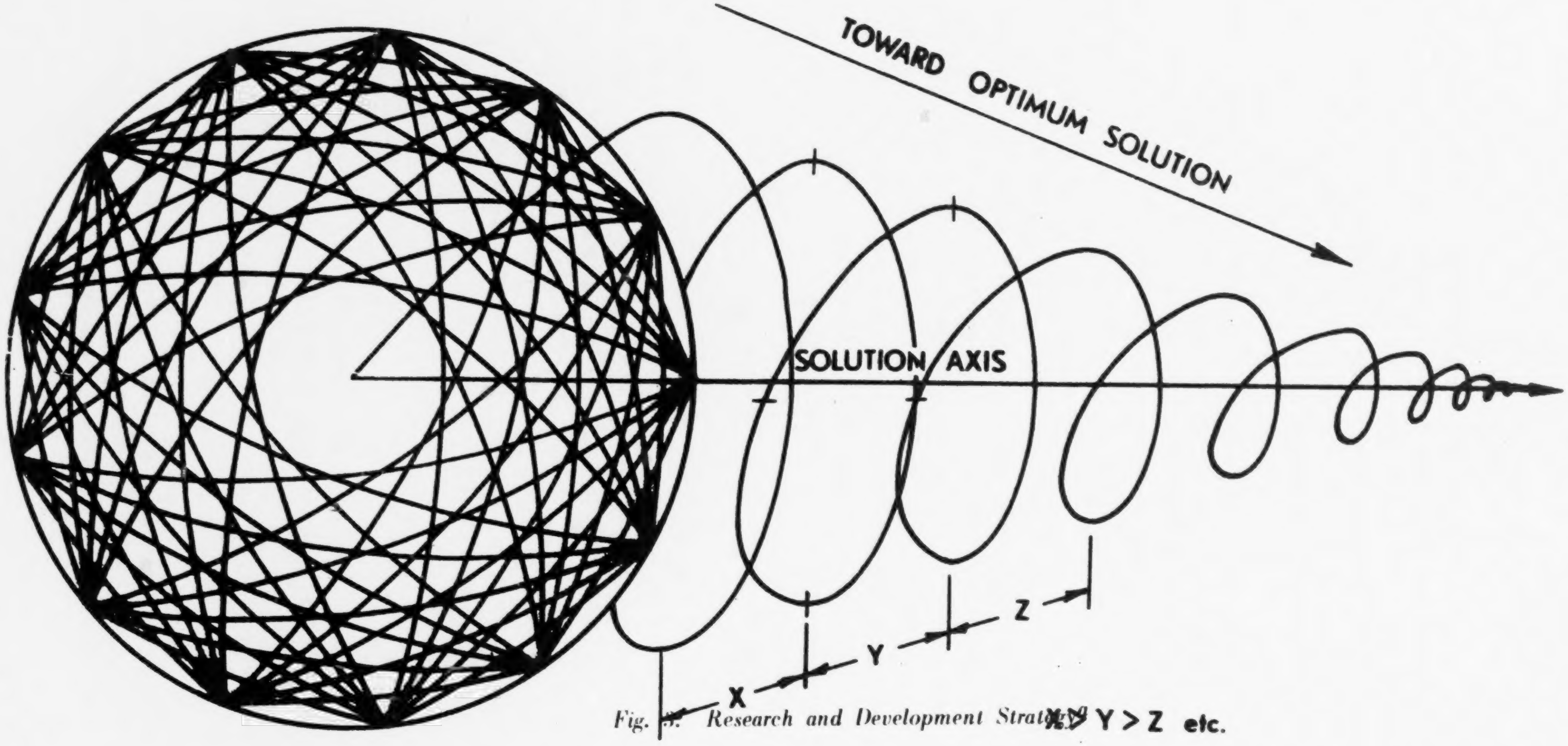

TOWARD OPTIMUM SOLUTION
SOLUTION AXIS
X
Y
Z
X > Y > Z etc.

Fig. 3. Research and Development Strategy[a]

[a] *The research specialist is indebted to Dr. Martin I. Taft, President of Socio-Economic Systems, Inc., Los Angeles for the idea for this graphic representation of the projects research and development strategy.*

To facilitate the collection of data, procedures were established for contacting the administrators, guidance counselors, and participating teachers in the secondary schools working with the American Industry Project. These procedures were reproduced and placed in the Project's Procedures Book. Each teacher received a copy to have available for reference. This book proved to be an effective communication and management device.

Summary

The American Industry Project grew from the concerns and ideas of a group of Stout State University professors. Stimulated and sustained by three grants, the Project developed a conceptual structure of the knowledges used in industry and three secondary school courses based upon this conceptual structure. An evaluation system was instituted to provide data for the evaluation and refinement of these courses. The information from this system was used to modify and enlarge the curriculum materials. Chapter II presents and discusses the data in the evaluation.

References

Face, W. L. and Flug, E. R. F. The establishment of american industry as a transitional subject between general and vocational education. American Industry Project, Stout State University, 1965.

Gagne, R. M. The conditions of learning. New York: Holt, Rinehart, and Winston, 1965.

CHAPTER II

ANALYSIS OF DATA AND FINDINGS

Introduction

The organization of this chapter is based on the three evaluation domains in the American Industry Evaluation System: (1) ingredients, (2) processes, and (3) products; and their interrelationships. In this chapter, analyses of data related to these domains and relationships are described in general terms and the discussions of the various findings are presented in more detail. Most of the detailed descriptions of the evaluation procedures, development of the data collection instruments and management of the evaluation activities appear in the appendixes. The reader interested in specific details and procedures should read the appendix related to his interest. A number of references to the appendixes are listed in this chapter to aid the reader in relating the two presentations. Final conclusions and recommendations appear in Chapter III.

The ingredients domain will be presented first to provide a context for the remaining data. The purpose of this initial section is to give a summary view of the types of students, teachers, schools, and instructional materials encompassed in the American Industry Project. Summary statistics are presented for each of these four factors. Those for the students, teachers and schools are constrasted with statistics from national studies. Interactions between ingredients variables and processes and products variables will be described in succeeding sections.

The processes domain will be discussed next in sequence. Analyses of the data on student-teacher relationships and their interaction with the instructional materials will be reviewed. Also the nature of the school environment will be discussed.

The products domain will be examined in the concluding section. Data on student achievement and the effects of the study of American Industry on the student after graduation will be discussed. Also, some of the influences the study of American Industry had on student's attitudes and interests will be noted and contrasted with those in the control group. In addition, some of the impacts of the American Industry Project on Stout State University and industrial arts curriculums throughout the nation will be noted.

Data for the last three years of the project are presented in the ensuing sections. The first year of the USOE grant, 1965–6, was used for the development of materials. This year was also used to try out several of the evaluation forms. Information from these activities was very helpful in planning and implementing the evaluation during the remaining three years of the Project. Prior to the last year of the grant the Project's budget was cut by the USOE as a part of an economy drive. As a result, evaluation activities carried out during the 1968–69 school year had to be curtailed.

Ingredients Domain

Ingredients refers to all the inputs to the learning environment. These range from obvious factors such as the characteristics of students and the nature of the teachers to less salient factors such as the structure upon which the American Industry instructional materials were based. Each of these inputs is important in defining the factors and conditions under which the treatments were effective.

Class Level of Students

During the last three years of the Project, the Level I course was introduced in grades seven through twelve even though it was designed for grade eight. This was necessary for two reasons. First, a number of teachers who had worked on the original materials during the Ford Foundation grant taught at the high school level. Second, there was a need for a base of Level I alumni in order to provide students for the Level II and the Level III courses. Thus, although a majority of the students enrolled in the Level I course were in grade eight, students from grades nine through twelve and grade seven also studied the Level I course. In all schools the students were representative of the students who typically enrolled in industrial arts.

A summary of the number of students enrolled by grade level in each American Industry course is given in Table 1. As noted above, the largest group of students enrolled in the Level I American Industry course were eighth graders. Only in 1966-67 did the eighth grade comprise less than 50% (35.8%) of the Level I American Industry students. In each of the three years the ninth graders were the second largest group. Thus, although older students were admitted to the first level course, a large majority of the experimental students were in grades eight or nine.

Table I gives a summary of the number of students in the American Industry classes and the control groups for each of the three academic years between 1966 and 1969. A brief review of this table reveals that approximately 88% of the experimental students, those who studied American Industry, enrolled in the Level I course only. A smaller number went on to the Level II and only a few selected Level III. Most of these differences can be attributed to the required sequence of American Industry courses, the small number of participating teachers, and the lack of room for elective credits in the programs of senior high school students which restricts their entry into industrial arts courses at this level. Also, Level III was developed during the summer of 1967. Thus, it was not available for use during the first two years of the Project.

Selected Characteristics

As previously noted, teachers and schools were not selected to conform to a specific research design; thus, it is important to review some of the characteristics of the students in the sample. Two factors have been selected for analysis: (1) occupation of the father, and (2) score on an ability test. These two variables reflect the general areas of socio-economic status and cognitive ability respectively.

TABLE I

Enrollment by Grade Level in American Industry and Control Groups, 1967-9

Year	Grade	LEVEL						
		1	2	3	4	5	6	TOTAL
1966-67	7	112	-----	----	62	----	----	174
	8	305	----	----	231	----	----	536
	9	202	----	----	62	----	----	264
	10	141	21	----	128	----	----	290
	11	62	22	----	58	----	----	142
	12	29	12	----	22	----	----	63
	TOTAL	851	55	0	563	0	0	1469
1967-68	7	47	----	----	50	----	----	97
	8	472	120	----	240	----	----	832
	9	170	----	----	64	----	----	234
	10	124	36	----	40	47	----	247
	11	29	8	----	12	20	----	69
	12	25	10	6	11	10	----	62
	TOTAL	867	174	6	417	77	0	1541
1968-69	7	----	----	----	----	----	----	0
	8	376	----	----	72	----	----	448
	9	107	29	----	49	----	----	185
	10	78	38	----	40	18	----	174
	11	29	1	----	15	12	----	57
	12	2	----	----	----	7	----	9
	TOTAL	592	68	0	176	37	0	873
TOTAL ALL YRS.		2310	297	6	1156	114	0	3883

Level Code: 1 = Level I, American Industry; 2 = Level II, American Industry; 3 = Level III, American Industry; 4 = Control for Level I, 5 = Control for Level II, 6 = Control for Level III.

Occupations of the fathers of the students in the American Industry Project's evaluation are summarized in Table 2. In contrast with the SCOPE findings (Tillery, Donovan and Sherman, a, b, p. 14 & p. 15), there is a tendency toward slightly more farmers, simi-skilled workers in the evaluation sample and fewer service workers, salesmen, proprietors and managers. However, these differences are not marked and give no indication that the students in the American Industry evaluation came from an elite group. Also, all types of socio-economic classes were represented in the sample.

Summaries of the ability scores for the students in the evaluation are reported in Appendix J. Means and standard deviations are reported for each group and for each year encompassed in the evaluation. Some variation in the average ability scores can be noted between schools and years. Average ability scores ranged from 88.7 to 118.4. However, most of the mean ability scores ranged between 95 and 105. A tendency for ability scores to decrease as grade level increases can be noted in the scores reported. In other words, the process of selecting industrial arts courses was related to ability. Within most schools the average ability levels and dispersion of abilities were similar for the American Industry and control groups. When equivalent control groups were not available quasi-experimental designs were employed.

It is evident from the statistics reported in Appendix J that the experimental and control groups contained a number of students of average and less than average ability as well as those with high abilities. In other words, American Industry was taught to students with abilities representative of those found in our normal school population.

The sample of students in the American Industry evaluation appeared to contain a cross section of students from our society. Students in the sample came from all socio-economic classes and exhibited the range of abilities typically found in public schools.

Teachers

One of the basic elements in the secondary school instructional system described in Chapter I was the teacher. In several respects, the teacher comprised the most critical variable. He controlled the learning environment and the applications of the treatment. His actions were central to the success of the American Industry secondary school curriculum. Hence, the characteristics of the participating teachers were especially important to the outcomes of the Project.

All but one of the American Industry teachers were teaching industrial arts prior to their affiliation with the Project. The other had just graduated from college. A summary of the participating teachers' teaching experience is presented in Table 3. A wide variation of years in teaching were evident with a range from zero to thirty-four years. The median was seven years. Three teachers were starting their first year at a new school, however, the median length of time in the current position was 3.5 years. Seven teachers had worked in only one school system with the median being 1.9 jobs for the group. Two teachers had held jobs in four school systems but they also had 13.5 and 34 years of teaching experience. As a group, the American Industry teachers were experienced teachers with considerable job stability.

TABLE 2

Father's Occupation

American Industry Evaluation

Year:	1966-7			1967-8			1968-9			SCOPE (Tillery, et al, a, b)	
Grade:	8	9	10	8	9	10	8	9	10	9	12
Occupation:											
Farm Owner	10.4[a]	6.7	13.9	11.2	4.0	4.0	5.9	6.0	6.3	3.7	4.4
Workman	16.8	17.7	13.9	8.7	19.7	8.0	10.1	9.9	11.0	11.9	10.4
Service Worker	3.1	7.7	7.0	4.7	6.3	5.4	4.1	4.7	5.1	7.7	7.1
Semi-Skilled	18.3	21.5	21.2	12.0	20.3	15.3	17.1	19.1	16.7	13.0	11.1
Skilled	16.8	18.2	19.1	19.7	29.6	26.9	22.3	25.0	24.8	17.3	20.1
Clerical	4.8	5.3	3.5	8.7	4.0	5.4	6.0	6.5	5.9	4.8	4.1
Salesman	6.3	5.3	4.0	5.5	2.3	7.0	6.8	5.4	5.6	8.2	8.7
Manager	5.8	5.7	2.3	7.0	5.2	6.0	6.7	6.5	5.9	6.9	8.7
Official	1.8	1.0	0.6	3.0	1.1	6.0	6.7	6.5	5.9	6.9	8.7
Owner or Proprietor	3.6	3.3	2.9	4.5	1.1	4.4	5.0	4.7	4.3	6.1	7.4
Professional and Technical	10.9	7.7	10.4	14.2	5.8	11.2	12.0	10.1	12.3	11.7	11.7
Do not know	1.5	0.0	0.6	1.5	0.0	0.0	0.4	0.2	0.5	4.8	3.0
Did Not Respond	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0.	3.5	2.8

[a] Figures in the table are percentages.

TABLE 3

Teaching Experience of the American Industry Teachers

	TEACHING EXPERIENCE		*NUMBER OF POSITIONS*	
Years	*Total Years Teaching*	*Years in Present Job*	*Number of Previous Jobs*	*Number of Teachers*
0	1	3	0	7
1	1	5	1	11
2	–	1	2	2
3	1	3	3	2
4	2	3	4	2
5	5	1		1.9
6	2	1		(jobs per
7	–	1		teacher)
8	2	1		
9	2	–		
10	2	1		
11	–	–		
12	–	1		
13	–	–		
14	2	1		
15	2	1		
16	1	–		
24	–	1		
34	1	–		

Mdn = 7 years *Mdn = 3.5 years*

The participating teachers had taught the following areas in industrial arts: Woods, metals, drafting, printing, and general shop. Their American Industry courses were taught in these same laboratories. In some instances, they were able to arrange access to another lab for some of their activities when this seemed desirable for the teacher.

Median age of the participating teachers was 30.2 years. The oldest was 58 and youngest was 24. A majority, 71% had master's degrees and several of these men had done some study beyond this level. Although most of the bachelor's and master's degrees were from Stout, participating teachers had undergraduate degrees from seven other universities and master's degrees from three other universities. Obviously, Stout's curriculum had a large influence on the skills and perceptions of the participating teachers.

Eleven of the participating teachers had formal industrial work experience. The longest term in industry was two years. Most of the work experience was in skilled and semi-skilled jobs that involved a relatively large amount of the manipulative activity. The avocational activities of the participants also indicated their interest in manipulative and physical activities. Hunting and fishing were the most popular outdoor activities with mechanics and woodworking being listed as favorite indoor activities.

Since American Industry included some content usually taught in industrial arts, the teachers were surveyed after the 1967–8 school year to determine concept areas in which they thought that they needed more information and education. The survey was conducted after the teachers had attended several in-service workshops and had taught at least one American Industry course. Hence, their responses identified the concept areas that presented the most persistent problems. (The complete report is reproduced in Appendix I.) In brief, more than half of the teachers responded that they needed more information on the materials, processes, and energy concepts. In addition, a need for more information in each of the remaining concept areas was noted by one or more teachers.

In summary, experienced industrial arts teachers were selected for the role of American Industry teacher. Considerable job stability and advanced professional training were revealed in the records of these men. These teachers enjoyed outdoor and mechanical activities. A survey of the participating teachers in 1968 indicated a need for further in-service work in several of the concept areas.

Instructional Materials

Designing the Curriculum

Two basic elements in the design of the Level I American Industry course were (1) the conceptual structure of the knowledges necessary to understand American Industry and (2) the theory and procedures involved in the development of learning structures as described by Gagné (1965) in The Conditions of Learning. The structure identified 13 primary concepts and the interrelationships between these concepts that were viewed as necessary in order to understand

American Industry. Thus, the scope of the content was defined. Although emphasis could vary to some degree, the structure implied a balanced treatment of each concept.

Having defined the scope and emphasis, the task of sequencing the instructional material remained. Since concepts are higher order cognitive processes, attention had to be given to the prerequisites for their attainment. Gagne's ideas related to learning hierarchies and his concepts concerning the conditions of learning were employed in distilling the sequence of objectives for the Level I course, identifying the lower order competencies required, and constructing learning activities. Figure 4 presents a condensed version of a learning structure for a relationship between the concepts of communication and marketing. Similar structures were developed for the other concepts and interrelationships.

The learning hierarchies suggested a definite sequence of objectives for the Level I course. In addition, they helped to define the requisite competencies needed to acquire the concepts in the structure. Since most of the concepts areas required communication acts, this concept was scheduled for study early in the course. The marketing concept was deferred until it could be used in the students' enterprise. Once both of these concepts had been acquired, the students were ready to study the interrelationship (principle) between them. This was the general nature of the sequence of the objectives in the Level I instructors guide.

To check the sequence of the objectives in the completed guide against the original design, a content analysis procedure was developed. In brief, this procedure involved the review of each lesson and the recording of the concept areas and interrelationships studied. (See Appendix F for a detailed description of the content analysis.) These data were then punched on tab cards and processed. Analysis of the results revealed that the sequence and content identified in the original plan for the Level I guide were attained. Teacher feedback contained eight ratings, 1.5% of all ratings, indicating that lessons in this guide were out of sequence. One-half of these responses were related to the sequence of the four lessons in Unit I. (See Appendix F for a detailed analysis of the teacher's feedback.) Later study indicated that the last two lessons in Unit I could be interchanged without any negative effects. Thus, with an optional sequence for the lessons in Unit I, the content sequence in the Level I Instructor's Guide appeared to be appropriate for the teachers in the Project's sample as well as being psychologically sound.

In review, Gagné's procedures for structuring content were used to define the sequence of objectives and the hierarchy of competencies in each concept area. Content analysis of the instructor's guide indicated that the lessons in the guide followed the sequence planned. Teacher feedback revealed that the sequence was appropriate. Therefore, it would appear that the Project's structure and Gagné's procedures were valid. (Richard Gebhart's paper reproduced in Appendix D presents a more complete description of the procedures utilized to design the secondary school courses.)

Instructors Guide

The instructor's guide had several functions. The order of the lessons established a sequence for the course and each lesson integrated the required learning resources and activities for the in-

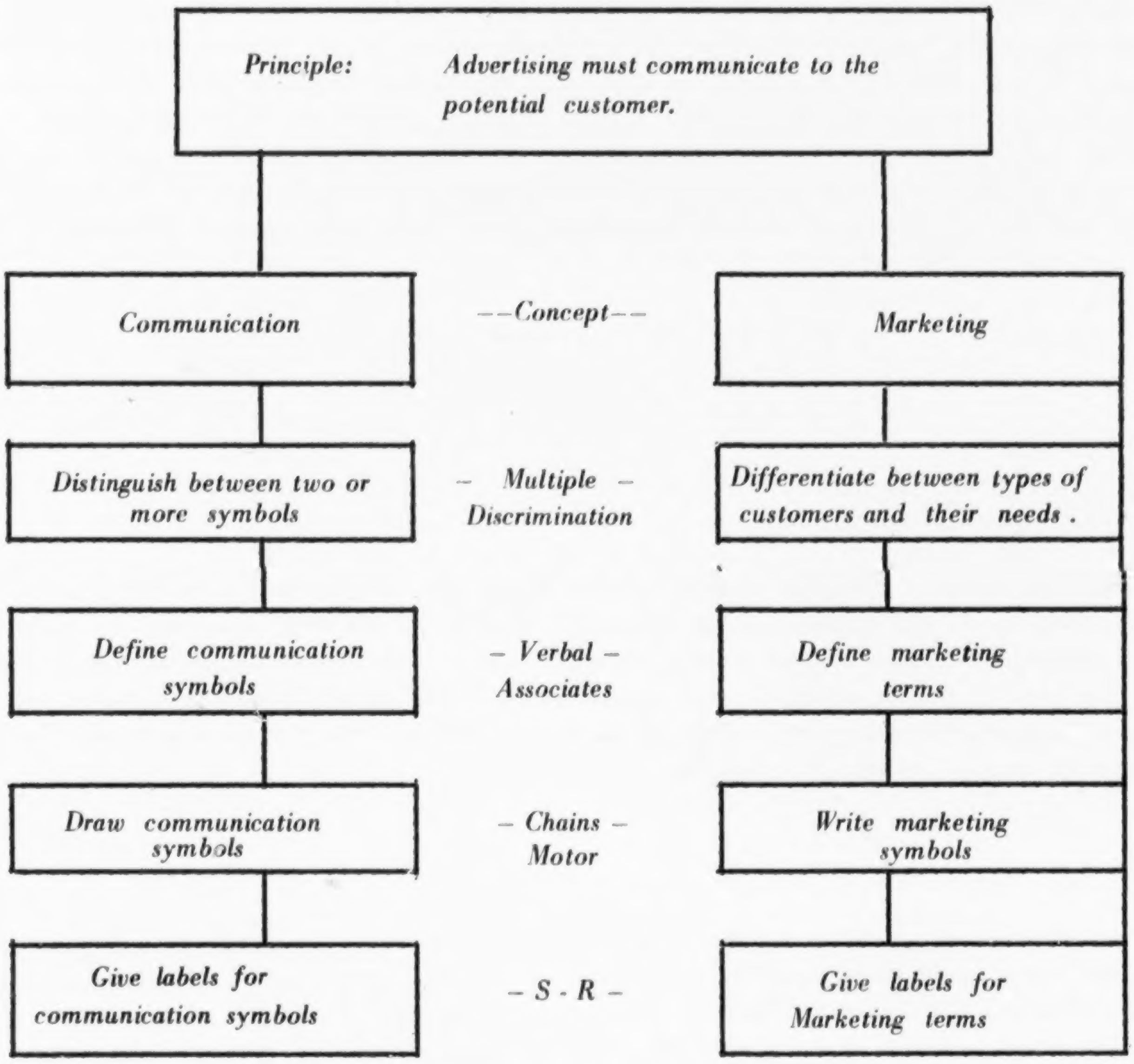

Principle: Advertising must communicate to the potential customer.
Communication
--Concept--
Marketing
Distinguish between two or more symbols
– Multiple – Discrimination
Differentiate between types of customers and their needs .
Define communication symbols
– Verbal – Associates
Define marketing terms
Draw communication symbols
– Chains – Motor
Write marketing symbols
Give labels for communication symbols
– S - R –
Give labels for Marketing terms

Fig. 4 Learning Structure for a Principle Involving Communication and Marketing

structor. Also, most lessons contained detailed content. This detail varied with the most extensive presentations occurring in the concept areas most foreign to the participating teachers. For example, the lesson on market analysis contained a detailed description of sampling procedures and methods for interpreting the data that resulted from the survey.

The final version of the Level I Instructor's Guide was based on the feedback from the participating teachers. It first evolved from resource units related to each of the concept areas to a guide which identified a sequence of learning experiences and was correlated with the original resource units. Then, when the participating teachers felt that this revision did not provide enough detail and direction, the content in the resource units was integrated with the lessons in the guide to provide one detailed reference for the teacher. In addition, some sections were amplified to solve problems identified in the teachers' feedback. During the third year of the Project, the detailed guide was used by all instructors teaching the Level I course. At the end of this year they responded as indicated to the statement: "This year's guide is much better than last year's." The detailed version of the guide appeared to satisfy several of the teachers' needs in the areas of content and sequence of learning activities.

SD	D	U	A	SA	NR
0	0	3	7	9	2

The first drafts of the Level II and Level III guides were written during the USOE grant. However, there were not enough time and resources to complete the field testing and to revise them. Preliminary content analysis revealed a need to modify the content, sequence, and emphasis in the Level II guide. Similarly, the Level III guide needed to be revised. Both would profit from the evaluation procedures utilized for Level I. Moreover, the first level guide could also be improved through continued evaluation.

Media

As lessons were developed for the instructor's guides, the media specialist reviewed them and developed media correlated to specific segments of the lessons. Lesson writers also suggested media for their lessons. As a result, a close tie between the lessons and the media was achieved. After using the media, only 9% of the participating teachers responses indicated that the instructional media being rated were not correlated with a given lesson. (See Appendix I for the complete study.)

Two major principles were used in developing the media for Level I. First, the media specialist set out to make the media functional. To achieve this, most of the visuals were done on overhead transparencies to allow visual input by the teacher during projection and to accomodate the projection equipment available in a majority of the participating schools. Also, printed narrations were included with the filmstrip and the slide series to reduce the need for tape recorders which were scarce in most of the participating schools. Second, color and cartoon characters were employed to make the media interesting. (John Zuerlein has described and illustrated these principles in a paper which is reproduced in Appendix E.)

Feedback comments from the participating teachers revealed that the media were an essential part of the instructional materials package.

Student Booklets

Seven student booklets, one for each unit of instruction were written for the Level I course. Booklet One introduced the student to industry. A brief history of industry was presented in booklet Two. Booklets Three, Four, and Five were based upon the story of the development and operation of a new enterprise. This story was part factual and in part fictional and provided referents for all of the major concepts in the Projects structure of the knowledges utilized in industry. The themes for Booklets Three, Four, and Five were "Organizing an Industry", "Operating an Enterprise", and "Distributing Products and Services", respectively. In booklet Six, the student was exposed to some ideas on the future of industry. Booklet Seven provided information to assist the students in starting their own enterprise in class. The purpose of this book was to aid the students in acquiring a concrete experience which would integrate and reinforce the ideas and concepts included in the prior booklets.

Feedback from the teachers indicated that the referents provided in booklets Three, Four, and Five were not perceived by all of the students. In response to the statement "most students could identify the concepts used by Wes as he managed Pronto Prefabs," 9.5% disagreed, 33% were undecided, and 47.6% agreed. However, as will be noted in the processes section, the booklets were not always used as intended. Thus, in these ratings the functional quality of the booklets may be confounded with the manner in which they were used.

The booklets were designed and written for eighth grade students. An analysis of the reading level with the Dale-Chall formula produced the following data.

Booklet	Title	Reading Level
1	Industry Today	7th - 8th Grade
2	Evolution of Industry	7th - 8th Grade
3	Organizing an Industry	8th - 9th Grade
4	Operating an Industry	9th - 10th Grade
5	Distributing Products and Services	10th - 11th Grade
6	The Future of Industry	9th - 10th Grade
7	Student Industry	9th - 10th Grade

The reading levels in the first two booklets met the criterion established. Booklet Three was at the upper limit of the criterion. Booklets Four, Six, Seven were slightly above the criterion and booklet Five was distinctly above the limit established. The major cause of the higher reading levels in booklets four through seven was the number of words not on the Dale list. Few technical and business terms are included on the Dale list. Thus, the introduction of these terms in booklets Four Through Seven increased their reading level. However, it was concluded that proper terminology should be used when possible. Hence, the curriculum specialist decided to use the booklets in the participating schools. A report of the student's opinions of the reading level will be given in the processes section.

Participating Schools

As noted in Chapter I, the American Industry Project did not have an opportunity to use a sampling plan in selecting its participating schools for this study. Most of the secondary schools and teachers involved in the original development of the American Industry Project financed by the Ford Foundation wanted to continue with the Project. After the four year grant was received from the USOE, a few additional schools were added on the basis of an interest expressed by one or more of the teachers in their industrial arts department and the potential for implementing all three levels of American Industry. This resulted in a set of participating schools located in small to medium sized cities. In 1966, the Project sought and acquired a working relationship with a large city. Ensuring data and comparisons are presented to define the characteristics of the participating schools and contrast these traits with statistics for a national sample of schools.

Three of the most important school characteristics associated with student performance that were identified in the studies of the American High School by Dailey (Flanagan, Dailey, Shaycoft, Orr & Goldberg, 1962 pp. 9-36), were (1) beginning teacher's salaries, (2) amount of teaching experience of staff, and (3) per pupil expenditures. These factors had the highest and most exclusive relationship with student performance. Table 4 presents a summary of the data from Project TALENT and the American Industry participating schools. Characteristics 12, 7, and 10 in Table 4 contain the information on the variables identified above.

The average salary in the 1965-66 school year for a beginning teacher in the participating schools was $5150. In comparison with NEA statistics (1966), the average for the participating schools was slightly lower. However, the range of starting salaries in the sample of participating schools was typical of those offered in the region. The difference between the mean for the American Industry schools and the Project TALENT sample could be made up by average annual raises of $280. Thus, there does not appear to be any significant difference between the two samples in the starting salaries of teachers.

Turning to the experience variable, the staffs of the participating schools have slightly more experience than the national sample with a higher proportion of teachers having twelve or more years of teaching experience. However, there is little difference in the lower range of experience. Both samples have approximately 30% with 0 to 8 years of experience. Most of the differences come in the 9-11, 12-14, and 15 and over categories. Since the main variation is at the higher experience level, there would appear to be little difference in quality on this variable.

Average per pupil expenditure in the American Industry schools, during the 1965-66 school year was $538.23. This contrasts with an average of $533.00 reported in the NEA

TABLE 4

Participating Schools Characteristics

		Samples				
	Characteristics	American Industry		Project TALENT (Flanagan et al., 1962)		NEA (1966)
1.	Type of school	100 % public		87.1 % public		
2.	Accreditation	100 % state and/or regional		91.8 % state and/or regional		
3.	Participated in tryout of experimental curriculum	90 %		21.4 %		
4.	Tried own special curriculum	80 %		37.8%		
5.	Average amount of homework	0 - 1 hours:	0%	0 - 1 hours:	8.9%	
		1 - 2 hours:	75%	1 - 2 hours:	57.9%	
		2 - 3 hours:	20%	2 - 3 hours:	27.1%	
		3 - 4 hours:	5%	3 - 4 hours:	5.5%	
6.	Absenteeism rate	0 - 2%	0%	0 - 2%:	19.3%	
		3 - 5%	70%	3 - 5%	46%	
		6 - 8%	30%	6 - 8%	25.8%	
				9 - 11%:	6.8%	
7.	Experience of staff	0 - 3 years:	1%	0 - 3 years:	1.4%	
		3 - 5 years:	9%	3 - 5 years:	7.8%	
		6 - 8 years:	20%	6 - 8 years:	20.3%	
		9 - 11 years:	10%	9 - 11 years:	27.7%	
		12 - 14 years:	35%	12 - 14 years:	20.7%	
		15 and over:	25%	15 and over:	22.1%	

TABLE 4

Participating Schools Characteristics (Continued)

	Characteristics	American Industry	Project TALENT (Flanagan et al., 1962)	NEA (1966)
8.	Senior class size	$\bar{X} = 347$ S. D. = 200	$\bar{X} = 85.7$ S. D. = 126.8	45.2% larger than 1960
9.	Per cent going to 4 year college	41%	35%	39.1%
10.	Average per pupil expenditure in system (Dollars/year)	$\bar{X}$ = \$538.23	$\bar{X}$ = \$374.58	\$533.
11.	Type residence	expensive homes %5 modestly priced 90% low cost homes 5%	expensive homes 1.5% modestly priced 53.6% low income areas 10.8%	
12.	Average starting	\$5150.	\$3751.	\$5166.[a]
13.	Size of community	mdn - 10,000 R is 3500 to 750,000	-------------	

[a] This is average starting salary reported in the NEA Research Bulletin for the 150 largest school systems in the United States. In 1960 the mean was \$4145 for this same sample.

Research Bulletin (1966a, p. 39). Thus there was no difference on this variable.

In terms of the three variables just discussed, there is no meaningful difference between the American Industry schools and schools in general. On the basis of Project TALENT's findings (1962), the educational environment in the participating schools was representative of the environment in schools in general.

Table 4 also presents a number of additional characteristics that help in defining the nature of the participating schools. All of the participating schools were public institutions with state or regional accreditation. Project TALENT reported a slightly lower total for their national sample. A large majority of the participating schools had previously participated in the tryout of an experimental curriculum (90%) and had tried their own special curriculums (80%). Experiences with experimental curriculums was considerably lower in the Project TALENT sample. However, five years had intervened between the two surveys, during which time a number of curriculum projects had been functioning. Thus, this difference may reflect more of a change in curriculum development activities than a difference in samples.

Absenteeism rates and the amount of homework expected were very similar for both groups. The average size of the senior class varied drastically between the two samples. However, NEA (1966a, p. 37) reported that the number of high school graduates had increased 45.2% from 1960 to 1965. Increasing project TALENTS's sample average by 45.2% gives a mean of approximately 124 students per senior class. This is still considerably lower that the mean for the participating schools. Considering this evidence in concert with the population size of the communities in which the participating schools were located median = 10,000 and a range from 3,500 to 750,000 it is evident that the sample of American Industry schools represented larger schools and communities than those found in the national sample.

Principals in the participating schools estimated that 41% of their seniors were enrolling in a four year college after graduating from high school. In the NEA report, it was estimated that 39.1% of the high school graduates in 1965 entered a four year college (1966, p.37). Thus, the college attendance rate in the American Industry schools was similar to that for all high schools in the nation.

One measure of the socio-economic status of students is the type of residence in which they live. A comparison of quality of housing in each group revealed that the students in the American Industry sample came from more expensive homes. In contrast with the national sample in which 53.6% of the students were estimated to live in modestly priced homes, 90% of the students in the participating schools were said to be living in modestly priced homes. While schools in the national sample classified 23.2% of their students as living in predominatly low cost homes, only 5% of the students in the participating schools were classified in this manner. None of the participating schools was identified as being. in a low income area; however, 10.8% of the schools in the national sample were. (Two special associations which the American Industry Project developed with disadvantaged schools will be discribed at the conclusion of this chapter). From the quality of housing measure it would appear that the status of the American Industry sample was slightly better than the average socio-economic level in the Project TALENT sample. However, when the occupational level of the students' fathers (summarized in Table 2) was considered, there would appear to be little or no difference in the socio-economic status between the two groups.

In summary, with the exception of size, the participating schools were very similar to the schools in Project TALENT's national sample. Participating schools were located in more medium sized cities than were encompassed in the national sample.

Summary

The American Industry conceptual structure of the knowledges of industry and Gagne's concept of learning hierarchies were used to design the structure and select the contents for the American Industry secondary school curriculum. Instructional materials for the first level course were field tested and revised three times. Content analysis and teacher feedback indicated that the Level I Guide produced in the summer of 1967 had an appropriate sequence and valid content.

Students in the evaluation exhibited characteristics similar to those in a national sample identified by Project TALENT. The students' abilities and their father's occupations were very similar to those found in the Project TALENT sample. School characteristics also paralleled those in the national sample. Thus, although the American Industry sample was not selected on the basis of a formal sampling plan, the schools, teachers, and students possessed characteristics similar to those in the Project TALENT sample. As a result, it would appear that American Industry has been taught under conditions and to students typical of those found in most regions of the United States.

Processes Domain

Data in this domain are directly related to the activities initiated to direct, sustain, and enhance learning. In this domain there was concern with the interactions between the teacher and student, teacher and instructional materials, and student and instructional materials. In addition, the interactions between these components and the school environment were of interest. Information on these variables provided an indication of the operating characteristics of the instructional materials and the nature of the American Industry classes conducted in the participating schools. The ensuing sections present information gathered on each of these interactions. Unless otherwise noted, the data reported are for the final version of the Level I Instructor's Guide and the Level I course defined by this guide.

Student - Teacher Interaction

In a study carried out during the first year of the USOE grant, Egan (1966) concluded that students gave evidence of a more positive attitude for this American Industry class than for the remaining classes in their program of studies. Data for this study were collected in the following manner. Students in the American Industry classes were asked to list in rank order the classes they liked and disliked. They also were requested to list a reason for their ranking.

The responses of the students were summarized and the preferences for various courses were analyzed. Egan (p. 33) found that 60% of the students reported that they liked their American Industry class and 21% indicated that they disliked their American Industry class. In contrast, approximately 45% of the students responded that they liked English, math, and science; and 47% reported a dislike for English, while 27% indicated a dislike for math and science. The chi square value for these differences was significant at the .01 level.

Egan also asked the students to list their specific likes and dislikes in relation to the American Industry course. After reviewing the responses on this section of his instrument, Egan (p. 41) concluded that the teacher's managerial ability, the utility of the course, and the type of laboratory activities included in the course were the three most important causes of likes and dislikes.

Egan's study was replicated during the 1967-8 school year and very similar results were obtained. At the end of the 1967-8 school year 56.5% of the students included American Industry in their "like" list and 22.3% stated that they disliked it. Similarly, the teachers' managerial ability, the nature of the lab activities, and the relevance of the course remained as the prime factors in liking and disliking the course. (See Appendix 0 for a detailed report of these studies.)

On the basis of Egan's study and the results of the later study, the Project encouraged the development of relevant learning activities and simulations of industry. In addition, the participating teachers were encouraged to use appropriate teaching techniques with the diversity of schools, teachers, and students encompassed in the Project's evaluation. It was not possible to completely satisfy this need. However, the opinions of the participating students indicated that they were generally satisfied with American Industry and with many of the specific activities to which they were exposed.

Teacher - Instructional Materials Interaction

The evaluative comments of the participating teachers indicated that the Level I course materials and instructor's guide functioned effectively in their American Industry classes. Each teacher who had used the final version of the Level I guide was asked to rate a series of statements related to its qualities. All of these statements were rated favorably with two exceptions - (1) 90% had difficulty completing the course on time and (2) most wanted more flexibility in the guide.

Favorable comments were received on the scope, format and quality of the instructional materials. Only 10% of those responding (N=20) had any problem understanding any part of the instructor's guide. A majority (60%) thought that the guide was essential to teaching the course. And, 90% responded that the format of the guide was easy to follow. Three teachers (15%) thought that the lessons should have had more content. None of the participating teachers thought that the format of the lessons was not functional.

The instructional media were also evaluated favorably. None of the participating teachers thought that straight lectures held the student's attention better than the combination of overhead transparencies and their lectures or discussions. In addition, approximately 75% of the teachers concluded that the instructional media were an important part of the materials supplied by the Project. (Appendix I contains a complete summary of the teachers' responses on the 1967-8 End of Year Report.)

Participating teachers also rated each of the lessons they taught. A rating form was included at the end of each lesson and the teachers were asked to evaluate each lesson as soon as possible after it had been completed. The second item on this evaluation form asked the teacher to rate the overall quality of the lesson as "excellent", "good", "fair", or "poor". Numerical values of 1, 2, 3, and 4 were assigned to these categories respectively. (See Appendix F for a detailed presentation on the feedback system and a complete summary of the feedback.)

Analysis of the teachers' responses revealed that the average rating given all lessons was 1.79 or somewhat better than "good". Only 10 of approximately 600 ratings fell in the "poor" category. Many of the low ratings were assigned to the lessons in Unit II - Evolution of Industry. This unit dealt with the history of industry and proved to be a difficult unit to develop and teach.

Ratings for the lesson objectives and content outlines were favorable. Less than 4% of the responses indicated that the objectives were not clear. Approximately 9% of the ratings on the content outline assessed it as lacking detail or not being logical. However, the only systematic pattern of negative ratings was found in the responses to Unit II.

Ratings and comments made by the participating teachers suggested the need for more activities to develop the concepts in the structure. This was primarily a problem related to the quantity of activities since the response to those listed in the lessons was favorable. Most of the teachers developed their own activities to supplement those in the guide. On the basis of this feedback, it would appear that there is a definite need for the design of additional activities that facilitate concept learning.

Unit rating forms were included at the end of each unit. Responses on these forms paralleled those on the lesson ratings. The average unit rating was 1.83 in contrast to 1.79 for the lessons. No "poor" ratings were given to any unit. Again, Unit II had the lowest evaluation.

Provisions were made in the design of the Level I Instructor's Guide to gather data on three additional questions of interest to the staff members writing the guide. First, how much detail should the content outline in the lesson contain? Second, do deductive and inductive lessons meet with the same level of approval? Third, do the participating teachers prefer lessons which involve making products more than those which stress cognitive learning?

To obtain information on the first question, detailed and outlined lessons were included in each of several concept areas. An attempt was made to have each type cover material of equal difficulty. Analysis of the ratings of these lessons disclosed significantly more "poor" ratings for the outlined lessons. (See Appendix F for the data and analyses related to these questions.)

A similar procedure was employed to acquire data on the second question. Deductive and inductive lessons were written in each of several concept areas. Analysis of the ratings revealed no significant differences. It appeared that both types were equally well received.

To answer the third question, ratings for lessons dealing only with production of a product were contrasted with those concerned with the development of concepts and knowledges related to industry. A significant difference in favor of the production lessons was observed in the ratings.

The lesson rating form also asked the teacher to assess the contribution of the student booklets to the attainment of the lesson objectives. Approximately 12% of the responses indicated that the booklets had little relevance to the lesson. Often this rating was amplified by the comment "the lesson should be based on the booklet". Statements of this type suggested that the booklets were not always used as intended. In addition, comments in the students' evaluation of the course indicated that the booklets were not always utilized in a manner that would help establish and reinforce the concepts included in the lessons.

When specific readings in a student booklet were identified in a lesson 97% of the ratings gave evidence that they had been used. However, when pages were not identified the teachers tended not to use the booklets. A similar problem was observed with the use of additional references such as periodicals and pamphlets. About 8% of the references of this type listed in the lessons were utilized. As a result, of this finding, the Project procured and distributed a number of pamphlets and issues of periodicals germane to the courses.

The favorable ratings found in the teacher feedback were substantiated by the observations of the Project's supervisor of participating teachers. Each participating teacher was visited several times during the school year. Analysis of the supervisor's recorded observations revealed that 50% of the teachers followed the guide and made few if any modifications. Another 45% made some modifications but retained the basic structure of the guide. One teacher developed his own course.

The importance of the guide can be observed in the test results from the school in which the instructor developed his own course of study. Means for the Achievement Test for the 1966–7, 1967–8, and 1968–9 school years are plotted in Figure 5. During the 1966–7 school year, this teacher followed the general intent of the Project's instructor's guide. In the 1967–8 school year he developed his own course. At the end of the 1967–8 school year this teacher moved to another school system. A new teacher was oriented to the instructional materials during the summer. Since this was his first experience with American Industry, he followed the instructor's quide. Comparing these means with a one-way anaylsis of variance produced an F value of 8.73 with 2 and 243 degress of freedom. This value is significant at the .01 level. All of the boys at the grade level were enrolled each year. The average I.Q. for the three years were 107.7, 106.7 and 106.1 respectively. Thus, it would appear that the major variable influencing performance was the degree to which the intent of the Level I Instructor's Guide was followed.

To summarize, the final version of the Level I instructional materials, first used during 1967-8 school year, were favorably evaluated by the participating teachers. The instructional

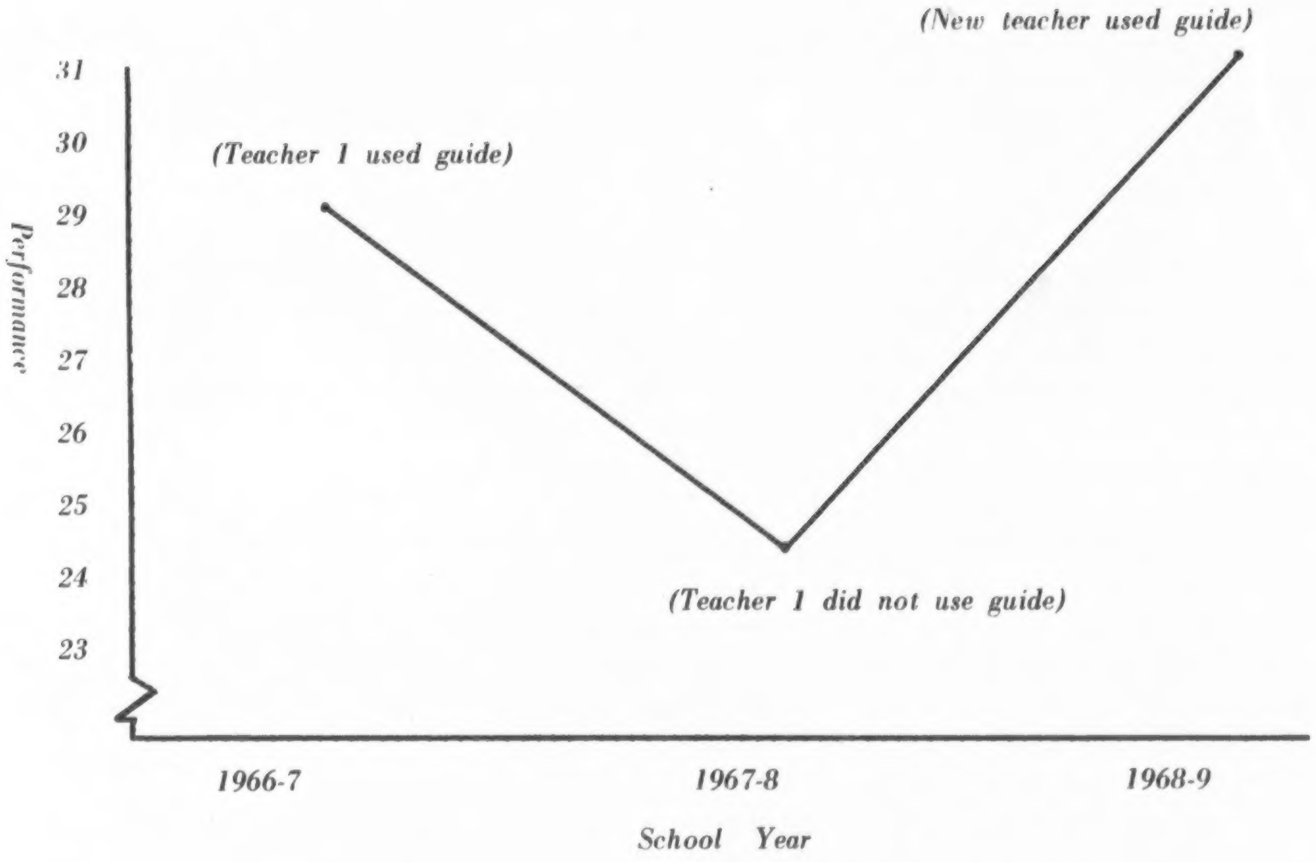


Fig. 5 Effects of the Use/Non-Use of the Instructor's Guide on Mean Performance Score on the American Industry Achievement Test

Source	*SS*	*d.f*	*m.s.*	*F*
Years	*1189.27*	*2*	*594.64*	*8.73**
Within years	*16552.75*	*243*	*68.12*	
Total	*1742.02*	*245*		

** P>.01*

media were judged to be very effective and essential to teaching the course. Student booklets contributed to the instructional system when their use was specified in the instructor's guide. The instructor's guide proved to be a critical part of the instructional system.

Student - Materials Interaction

As mentioned in previous sections, student booklets for Level I were written for eighth grade students. Most of the lessons in the instructor's guide listed readings in these booklets. After a booklet had been read, the American Industry students were asked to evaluate its characteristics by completing a rating scale especially designed for this purpose. A Likert format was used in this evaluation form. (The items and a summary of responses by grade level and year are given in Appendix G.)

Student ratings of the booklets were collected during the first two years the booklets were used. At the end of the second year, it was decided, for reasons of time, finances, and printing deadlines, that the booklets would not be revised during the last year of the Project. Since data for the 1966-67 years were available on these booklets, additional ratings were not requested.

Tables 5 and 6 present summaries of the responses to all booklets. The Likert statements used in the rating scale are listed in each table. Four items, 1, 9, 10 and 12, give a direct indication of the quality of the student booklets. Item 1 in the rating scale asked the responders to mark whether they agreed or disagreed that the booklet was interesting. In 1966-7, 59.2% thought that the booklets were interesting and 21.9% responded that they were not. Very similar results, 58.8% and 20.7% were found during the 1967-8 school year.

Students' perceptions of the amount they had learned from reading the booklets were revealed in the responses to items 9 and 10. During 1966-7, 58.7% of the students responding indicated that they had "learned a lot" from the booklet and 24.7% said that they had not achieved this level. The following year the students were more undecided with 50.1% agreeing that they had learned a lot and 21.7% disagreeing. Since this was a fairly strong statement, it would appear on the basis of students' perceptions that the booklets functioned effectively as far as learning was concerned.

Item 10 complemented item 9 in that it asked the student to indicate his prior acquaintance with the contents of each booklet. In each year, approximately 21% thought they knew most of the contents of a booklet before they read it. This figure is almost identical to the percentage who felt that they did not learn much from the booklets and who indicated that the booklets were not interesting.

During both school years, approximately 75% of the responses to item 12 concurred that the ideas in the booklets were worth knowing. Only slightly more than 8% disagreed with this statement. Obviously, the students thought that the material in the booklets was worth knowing.

In summary, the booklets were favorably received by the majority of the students. However, as will be discussed in the ensuing paragraphs, improvements are needed in some areas.

TABLE 5

Combined NRS Ratings for All Student Booklets
in American Industry Level I: 1966-7

		SD	D	U	A	SA
1.	I thought this booklet was interesting	7.9	14.0	18.0	51.5	7.7
2.	I want to find out more about what was in this booklet	7.0	22.1	37.4	28.1	4.5
3.	If the booklet were harder it would be more interesting	18.9	34.3	20.7	20.7	6.6
4.	This booklet was too hard to read	53.9	33.0	5.3	3.3	2.5
5.	I knew most of the words in this booklet	3.2	9.5	12.6	47.3	25.9
6.	This booklet was about as easy to read as my other school books	9.8	17.9	12.6	39.8	20.2
7.	This booklet was written for someone younger than me	9.9	27.2	22.2	22.3	14.8
8.	Each idea in this booklet should be discussed more completely	6.6	25.7	33.9	24.6	8.0
9;	I learned a lot from this booklet	6.4	18.3	22.2	46.4	12.3
10.	I knew most of the things in this booklet before I read it	13.2	48.1	22.1	17.4	4.0
11.	This booklet answered questions I have been thinking about	8.4	22.7	32.1	32.5	5.5
12.	I think the ideas in this booklet are worth knowing	3.8	5.4	13.9	54.7	20.2
13.	I could understand what this booklet said after discussing it in class	4.3	11.0	18.6	45.1	16.4
14.	This booklet was easy to understand	3.3	7.6	13.6	49.1	24.3

	SD	D	U	A	SA
15. This booklet was harder to understand than my other school books	40.5	39.2	12.3	5.4	3.3
16. The pictures helped me understand this booklet	10.7	18.0	25.0	34.0	8.6
17. The print in this booklet made it easy to read	3.2	4.9	12.8	52.2	28.7
18. I read most of this booklet	5.9	9.8	8.1	45.7	26.7
19. The definitions in the back of this booklet were helpful	3.6	5.3	16.1	44.0	32.1
20. More of the words used in this booklet need to be defined	13.3	29.3	28.8	18.9	11.8

TABLE 6

Combined NRS Ratings for All Student Booklets in American Industry Level I : 1967-8

		SD	D	U	A	SA
1.	I thought this booklet was interesting	5.7	15.0	20.3	51.8	7.0
2.	I want to find out more about what was in this booklet	7.0	27.3	35.7	25.7	4.0
3.	If the booklet were harder it would be more interesting	17.0	41.3	19.5	16.4	5.3
4.	This booklet was too hard to read	49.1	37.9	7.1	3.1	2.3
5.	I knew most of the words in this booklet	2.9	9.6	11.8	46.6	28.8
6.	This booklet was about as easy to read as my other school books	8.3	22.4	12.3	37.2	19.3
7.	This booklet was written for someone younger than me	8.2	31.9	25.0	22.4	11.5
8.	Each idea in this booklet should be discussed more completely	8.2	27.7	33.5	21.9	8.0
9.	I learned a lot from this booklet	6.5	15.2	27.0	40.4	9.7
10.	I knew most of the things in this booklet before I read it	9.4	44.4	24.1	17.8	3.5
11.	This booklet answered questions I have been thinking about	6.8	28.7	27.9	31.9	3.9
12.	I think the ideas in this booklet are worth knowing	2.6	5.6	15.0	59.9	16.5
13..	I could understand what this booklet said after discussing it in class	3.8	11.2	20.0	50.6	13.4
14.	This booklet was easy to understand	1.4	8.8	15.4	47.6	25.7

	SD	*D*	*U*	*A*	*SA*
15. *This booklet was harder to understand than my other school books*	37.2	43.5	11.7	5.1	1.3
16. *The pictures helped me understand this booklet*	12.6	24.9	25.3	31.4	5.2
17. *The print in this booklet made it easy to read*	1.8	5.3	12.2	49.5	30.3
18. *I read most of this booklet*	7.6	15.2	9.3	48.7	18.4
19. *The definitions in the back of this booklet were helpful*	3.5	6.6	18.4	45.1	25.7
20. *More of the words used in this booklet need to be defined*	11.1	35.2	28.8	16.9	7.6

As mentioned previously, the ratings refer to the first and only edition of the student booklets. Certain flaws have been indicated by the students' responses on the rating scale (NRS) and the participating teachers' comments. One basic problem centered on the names given to the characters in the booklets. The writer used the first names of the Project staff members which resulted in the two boys in the story being named Dick and Dan. These names caused some students to associate the booklets with their elementary school texts. Responses to item 7 revealed that about 36% of the readers felt that the booklets were written for someone younger. The simple act of changing names might reduce this unfavorable set on the part of some of the students.

Another weakness of the booklets was the limited use of illustrations. The Project's printing process limited the type of graphic illustrations that could be included. This limitation was reflected in the students' responses to item 16. In 1966-7, 42.6% thought that the pictures helped to understand the booklet. During 1967-68, this dropped to 36.6%. It would appear that the booklets could be measurably improved with better illustrations. Making these two revisions should improve the students' interest in the reading materials.

Trends in ratings by grade level of the responder may be reviewed in Appendix G.

Interactions with Environment

Learning activities in the American Industry courses were not designed to take place only within the confines of the classroom or laboratory. The student enterprise activity required customers from the school and community. Moreover, numerous referents for the American Industry concepts existed in each of the communities where the participating schools were located. Failure to make use of these resources would have been a serious omission.

Since American Industry was a curriculum innovation and the courses were in a developmental stage, the opinions, cooperation, and decisions of the administrators in the participating schools were very important. Also, the American Industry Project was interested in the reactions of the participating teachers' colleagues to the new course. Each of these factors would have some influence on the success of the American Industry program in the participating schools. Thus, provision was made in the Project's set of evaluation instruments to collect information on these variables.

During the 1967-8 school year, approximately 40% of the participating teachers had visiting speakers in their American Industry classes. About 50% of the teachers scheduled a field trip for their American Industry students. Although specific data were not collected on these learning activities for the other three years of the Project, reports and comments made by the participating teachers indicated that the 1967-8 data were representative of the remaining years.

Student interest in field trips warranted greater use of this learning expedient by teachers. More than 82% of the 1967-8 American Industry students responded that they would like to visit a business to see how it operates. For those that did visit an industry, the effect was lasting. Several students commented in the follow-up study that the field trips were very effective learning experiences.

With one exception, the participating teachers used the complete enterprise activity in their schools. In one school, administrative regulations prohibited the sale of products. To accommodate this situation, the teacher modified the enterprise to produce gifts for needy children and contracted with the school to manufacture articles required by the staff. Of those who used the complete enterprise, only two were uncertain if it created any problems in their school. The others responded that it did not cause any negative effects.

A large majority (71.4%) of the participating teachers thought that their administrators considered American Industry courses an important part of their school's curriculum. Only one teacher (4.7%) responded that his administrators did not think this course was important. More uncertainty was evident in the responses to the statement "If there were other teachers of American Industry in my school system, I believe the administration would initiate all three levels of American Industry in the school curriculum." Approximately 38% agreed with this statement, another 38% were uncertain, and 19% disagreed.

The opportunity for expansion did not appear to be as good as the evaluation of functioning American Industry courses would seem to indicate. However, the favorable response to the initial American Industry courses should provide a basis for persuading administrators to expand the American Industry program. Considering the newness of the American Industry courses and their significant departure from traditional industrial arts courses, it would appear that American Industry had made a favorable impression on the administrators in the participating schools.

Attitudes of the participating teachers' industrial arts colleagues seemed mixed. Approximately 33% of the participating teachers thought that their colleagues had a favorable attitude. Another 33% were uncertain. About 28% thought their associates had a negative attitude.

More interest seemed to be expressed by teachers from other school systems. About 43% of the teachers reported that they had been requested to make one or more presentations. And, 80% said that they had had visitors in their American Industry classrooms.

To briefly summarize, extensive use was made of field trips and visiting speakers. Students' interest and evaluative comments indicated that more field trips could be taken. Enterprise activities, especially the sales activities, did not appear to cause any problems for most teachers. However, some school systems had special regulations that needed to be identified prior to initiating this activity.

According to the teachers' reports, their administrators had a favorable attitude toward the American Industry courses in their schools. Attitudes of colleagues in the industrial arts department were more mixed. However, this was to be expected since American Industry was a challenge and somewhat of a menace to these men. The participating teachers noted considerable interest from visitors and a number of requests for presentations. Overall, the interactions between the American Industry instructional system and its environment were positive.

Student - Teacher - Instructional Materials Interaction

Observations made by the supervisor of participating teachers during the 1965-66 school years indicated that the teachers needed a more detailed instructor's guide. During this year, a number of participating teachers reported problems in planning their instructional sequences.

On the basis of this feedback, a more detailed guide was written for the 1966-67 school year. This guide was in turn revised for the 1967-68 school year. Reports of supervisory visits at the participating schools for the latter year gave evidence that the teachers, students, and instructional materials had formed an effective instructional system in a majority of the participating centers. A summary of the supervisor's observations revealed that 7% of the students were enthusiastic about the course and 68% were interested. The remaining 25% were identified as "cooperative". None of the classes were rated as "indifferent", "uncooperative", or "rebellious".

No doubt the presence of a visitor stimulated the students to behave somewhat better than normal. However, 50% of the teachers commented to the supervisor that their students were interested in the course. Another 30% said that the course was going fine or that the instructional materials were good. Since these comments were unsolicited, there appeared to be a positive interaction between the students, teachers, and instructional materials in most schools.

Enterprise.

A review of the student evaluation of the enterprise activity gives an insight into the quality of one of the major learning activities in the Level I American Industry course. This activity was also of special importance because it embraced all of the concept areas in the structure. Hence, student ratings should provide an indication of their interest in the course content.

A survey of student opinions taken after completion of the enterprise used in Unit I of the Level I course revealed that 83.5% of the participating students like the student enterprise. Only 6.3% reported that they disliked it. (See Appendix H for the detailed report of this study.) Nearly 77% responded that they liked the group work in the enterprise and almost 75% of the students said they liked the course at this point.

Less than 12% of the students thought selling the products produced in the student enterprise was not interesting. Most students (75%) said that making a profit added interest to the enterprise. Slightly more than 77% of the students thought that they learned a lot about industry during the first unit.

Observations made by the supervisor of participating teachers and the students' reactions to the enterprise activity indicated that the Level I courses were functioning effectively in most schools. Students reported a high level of interest in the student enterprise activity.

Summary

The processes section has presented information on the operating characteristics of the American Industry instructional system. Teacher, student, and teachers perceptions of administrator reactions to American Industry were found to be positive. Data gathered during the evaluation indicated that the instructional materials were not always used as intended. When these modifications were counter to the objectives and principles utilized in designing the materials this fact was reflected in the opinions and performance of the participating students.

Review of the participating students' ratings of the student booklets and the student enterprise activity indicated they thought that the knowledges encompassed in the American Industry courses were valuable. They also thought that the student enterprise activity was interesting and a worthwhile learning experience.

The effectiveness of including evaluation as an integral part of the curriculum development process can be observed in the refinement of the instructional materials used by the Project. Both the instructor's guides and the instructional media were enhanced through the use of evaluation feedback from the participating schools. The instructor's guide for Level I was significantly improved and the experience with this guide provided a basis for a model for the guides needed for Levels II and III.

Products

The central focus of the evaluation was to assess the effects of the study of American Industry. Of prime interest were answers to the following questions:

1. Do students who have studied American Industry have a more detailed knowledge of the concepts and structure of knowledges used in industry than those who have not?

2. Do students who have studied American Industry have a different perception of industry than those who have not?

3. Does the study of American Industry have any impact on career choices and decisions?

4. Does the study of American Industry have any influence on the students' ability to think conceptually?

Each of these questions will be considered in the following sections.

Effect of the Study of American Industry on Concepts and Structures

One of the major goals of the study of American Industry was to develop a conceptual knowledge of industry. As noted previously, considerable effort was given to tasks of distilling a conceptual structure of these knowledges and translating this structure into instructional materials. The previous section in this chapter, processes, reported the results of the evaluation of the instructional materials and procedures.

Achievement Test. An achievement test was designed to measure the cognitive outcomes of the study of American Industry. In order to facilitate data gathering, multiple choice items were used in this instrument. Since concepts permit rational responses to unique stimuli, problem situations were structured for the stems of the multiple choice items. Standard procedures for administering the achievement test were established to avoid disseminating the contents of the test items to the teachers and students. A detailed description of the procedures employed in writing the achievement test are given in Appendix J. Results of the comparisons between the American Industry groups and control groups within several school settings are also given in this appendix.

A basic concern in the development of the achievement test was content validity. Throughout the development sequence the contents of the items were checked against the project's conceptual structure to assure a valid instrument. A second concern was the accuracy of the scores on the achievement test. The median reliabilities for grades eight, nine and ten through twelve were .81, .84, and .85 respectively. These values were considered adequate for the Project's evaluation.

Table 7 presents a summary of the comparisons made between the Level I American Industry groups and control groups on the achievement test data. Statistically significant differences in performance were found in 33% of the comparisons. In each instance, these differences favored the American Industry groups. Another 11% of the comparisons resulted in F values that approached significance (.10>P>.05). Again, each of these comparisons favored the American Industry class involved. In only one experimental setting did mean performance on the achievement test for the control group exceed the mean for the American Industry group. The latter finding also indicated that the American Industry courses had some effects since, if there were no effect, the control group means should exceed the experimental group means as frequently as the experimental group means exceed the control groups means. Very similar results were found at Level II.

Table 7 also presents information on the effects of the length of course, semester vs. year, and the degree to which the instructor's guide was followed. Programs one year in length produced more significant differences than those which were of semester length. Approximately 41% of the year long programs produced significant differences. In contrast, 30% of the semester courses resulted in significant differences.

None of the American Industry classes in which the instructor's guide was not followed performed significantly better than its control group. This reflected both on the value of the guide and the fact that non-use of the guide typically resulted from a difference in philosophy between the teacher involved and the Project. Since the achievement test was based upon the Project's concepts and structure, programs which moved away from this rationale had less chance to produce significant differences in performance. When only the programs taught by the teachers who followed the guide are considered, approximately one-half of the comparisons are, or approach being significantly different.

During 1967–68, the impacts of major revisions in the instructional materials can be observed. For this year the instructor's guide was completely revised and new media were developed. The long range results, however, may be seen in the improved performance in 1968–69.

Although the results of the comparisons may not be as dramatic as one might hope for in the outcome of a new curriculum, two points must be kept in mind. First, 1968–69 represented

TABLE 7

Relationship of Student Performance
to Extent Instructor's Guide
Were Used in Level I

Extent Instructor's Guide Used	Length of Course	1966-67			1967-68			1968-69			Totals		
		S.D.	.10-.05	N.S.D.	S.D.	.10-.05	N.S.D.	S.D.	.10-.05	N.S.D.	S.D.	.10-.05	N.S.D.
High	Year	3	-	4	3	1	1	1	1	1	7	2	6
	Semester	3,[a]	4	5	2	-	9	5,[b]	-	3	10[ab]	4	17
Low	Year	-	-	1	-	-	1	-	-	-	0	0	2
	Semester	-	-	3	-	-	3	-	-	1	0	0	7
TOTAL		6,[a]	4	13	5	1	14	6,[b]	1	5	17,[ab]	6	32

a disordinal interaction

b significant gain scores, no control group available the initial year in which all of the Level I materials were utilized by teachers who had prior experience in their use. Second, the achievement test was designed to provide data for the improvement of the American Industry curriculum. Thus, most of the items in the test presented novel situations in which the students had to apply the knowledges and concepts they had acquired. For example, in the following test item, the distractors disclose whether the student had information on the costs, insulative qualities, and strength of common materials. If, for example, a student thought that materials were selected for their strength, he would select D as the appropriate choice.

Why would mahogany paneling be used in the
office of the president of an enterprise?

A. To reduce building cost

* B. To communicate his status

C. To improve the insulation of the office

D. To strengthen the office walls

The response distributions for this item for all of the American Industry and control group students tested in 1966-7 and 1967-8 were:

Response	American Industry	Control
A	7.3%	11.4%
B	74.1%	57.0%
C	13.9%	21.2%
D	4.7%	10.4%

These data indicate that the control group students were more likely to base their choices on the more salient characteristics of materials. (Chi square value is significant at .05 level.) The 17% difference is not dramatic but the responses to the item provide some critical insights into the students' structure of knowledge. Items could have been written on specific bits of knowledge which would have produced larger differences in scores. However, these items would not have produced the information needed to develop and revise the curriculum.

Another index of the strength of an experimental treatment is its ability to produce significant effects in subsequent experimental settings. Test results for three years, 1966-69, in School H are graphically displayed in Figure 6. Each American Industry class was one semester long. Before school started each fall, the treatment, the study of American Industry, was randomly assigned to one class. The other class(es) served as controls. During the second semester the first semester control group (s) studied American Industry and the first semester American

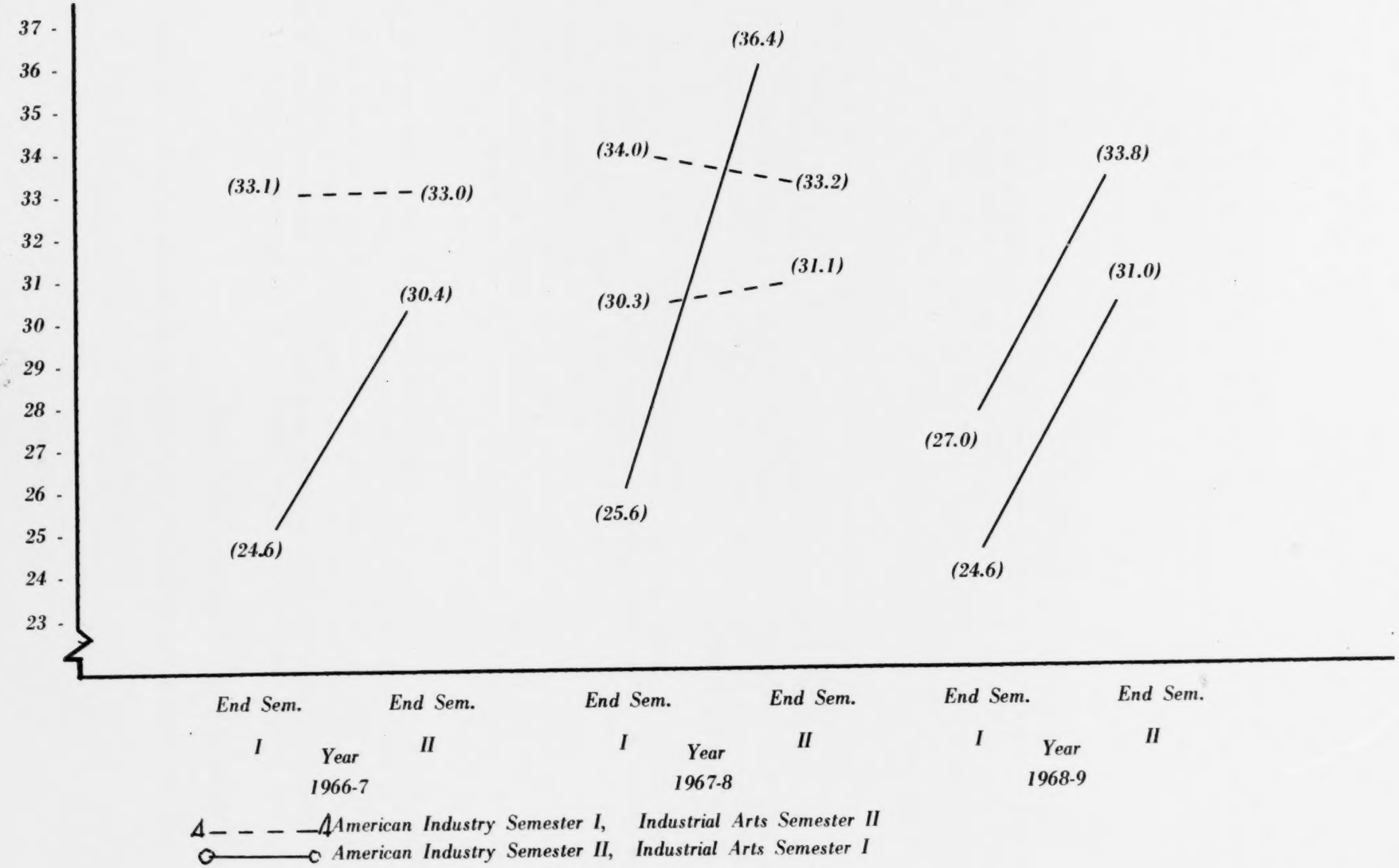


Fig. 6 Performance on Achievement Test in School H

Industry group studied industrial arts. Both groups had the American Industry instructor during each term, however, he taught industrial arts to the control group. During the 1968-69 school year, the schedule did not permit a control group

Statistical comparisons of the achievement test performance of experimental and control groups at the end of semester I and semester II in 1966-7 and 1967-8 using analysis of variance and analysis of covariance respectively revealed that the American Industry classes gained significantly more knowledge during each semester. A t-test of differences on the 1968-69 scores disclosed significant gains for both classes. Also, the slopes of the acquisition lines for the two classes in 1968-69 are very similar to those for the first two years--especially to the slope in 1966-67.

Another hypothesis related to the effectiveness or strength of the American Industry treatment was than gains in performance on the retention test (semester II administration for the students who had American Industry during semester I) should be zero or negative. This hypothesis was suggested by the findings in learning research that disuse leads to forgetting. In two instances, this hypothesis was confirmed with a decrease in performance. In the third instance there was a slight increase in performance.

As noted previously, it was not possible to develop Level II to the same degree as Level I nor was there an opportunity to evaluate it in as many settings as Level I. In the seven comparisons made, two (29 %) revealed significant differences in favor of the American Industry class, one (14 %) approached significance, and four (57 %) were not significantly different. In each comparison, the American Industry groups mean performance was higher than that of the corresponding control group.

Only one of the teacher and school characteristics appeared to have a relationship with student performance. Two teachers pestered the Project to be included as participating teachers. These men had followed the development of American Industry during its initial phases and were determined to include it in their program. Each of these teachers produced statistically significant differences in performance on each occasion they taught American Industry. This should not be inferred to mean that the other teachers were not interested. However, they did not enter the Project in the manner described above. Moreover, several of the teachers invited to join the Project also produced significant differences.

Follow-up Study. In regard to the relevance of the information and concepts acquired in the study of American Industry, a majority of former students in response to a follow-up survey said that what they learned in American Industry was of high value and another 59.7% rated it as of moderate value on their jobs. The remaining of 8.3% said that it was of no value. Almost 92% of the responders considered that what they had learned in American Industry was of value in their everday activities. (See Appendix M for the report of this study.)

Relationship Between Ability and Performance

The high ability groups consistently performed better on the achievement test. In 85%

of the comparisons in which ability groups could be stratified, the high ability group performed significantly better than the middle and low ability groups.

Only two interactions between ability and treatment were observed. Both of these were disordinal interactions that involved a reversal between high and middle ability groups in the American Industry and control groups. In both instances, the middle ability group in American Industry out performed the high ability group which had experienced the same treatment. In the control group the high ability group performed better than the middle group. Since there were so few interactions, they probably do not reflect a significant relationship between ability and course content.

Summary

In summary, the results on the Projects' achievement test were somewhat ambivalent. Less than 50% of the comparison involved significant differences in performance on the achievement test. However, when the comparisons in which the instructor did not follow the Projects' instructors guide are discounted, the percentage of significant and near significant differences is slightly more than 50%. In addition, the effects reported for School H demonstrated that the study of American Industry can consistently produce significant effects. Also, the students included in a follow-up study of graduates, indicated that what they had learned in their Level I American Industry courses was relevant to their jobs and to their everyday activities.

Students' Perception of Industry

In a study conducted during the 1967-68 school year, American Industry students were found to have more positive attitudes toward industry than their peers in the control groups. These attitudes were reflected in more positive responses to statements such as "I have greater appreciation for industry after studying it in class" and negative responses to statements such as "products produced by industry are usually of low quality." (See Appendix L for the detailed report of this study.)

Analysis of the response patterns for each of the items in the attitude toward industry scale revealed that the American Industry students exhibited a significantly more positive attitude toward industry. Thus, on the basis of these data, the study of American Industry appeared to produce a more positive perception of industry.

Impact on Career Choices and Decisions

In a study of interests and attitudes influenced by the study of American Industry, Nelson (1968) found two Likert items on which the American Industry students had a unique and more positive response pattern than the students in the control groups - (1) "I will probably work in industry" and (2) "There are many job opportunities in industry that I did not know about before taking this class." Approximately 56% of the American Industry students agreed with the latter statement and only 18% disagreed. In contrast, 44% of the control group students agreed with this statement and 21.7% disagreed. The remaining students in both groups were undecided. Nearly 36% of the American Industry students responded that they would probably work in industry, 33.2% disagreed, and 45.1% were undecided.

These additional statements directly related to occupational decision making were included in the instrument used in this study. On two of three statements - (1) "This class has changed my thinking about the work I will do after my schooling has been completed," and (2) "This class has started me thinking about the work I will do after my schooling is done," American Industry and control groups did not indicate that the two patterns were significantly different.

Responses to the last statements on occupational behaviors - "Some day I might start a business of my own" were very similar for each group. About 33% of the American Industry and control group students agreed with this statement, 43% were undecided and 20% disagreed. (See Appendix L for the complete study.)

In the fall of 1969, a follow-up study was conducted. Since the majority of the students associated with the Project had studied American Industry while they were in junior high school, the number of high school graduates from the American Industry and control groups was small. In total, 121 students from three schools were contacted in this follow-up study. All of the American Industry students in this study had enrolled in only the Level I course, during their years in senior high school.

Table 8 presents a summary of the influences reported for educational plans. The chi square value for this set of responses was not significant. It is interesting, however, to note that a majority said that their high school courses, American Industry included, had no effect on their educational plans. Possibly the student's plans are fairly well determined by the time he enters high school or high school experiences have only a minimal effect on his plans. Also, it should be mentioned that the students in this sample were probably not individuals who had extensive and well defined plans for education beyond high school. The group had average I.Q.'s and were not pursuing the traditional college prep program. In addition, less than 20% entered college after graduating from high school. This contrasts with the more than 40% rate of college attendance reported by the principals in the three schools. Also, as noted in Table 2 the tenth through twelfth grade sample from which these students came had more students from lower level occupations and slightly fewer from the managerial, professional and entrepreneurial levels.

Even though relatively few effects on educational plans were reported by American Industry students, substantial impact was reported by several students. For instance, one former student said that his experiences in the marketing phase of the student enterprise led him to pursue a college degree in marketing research. Another responder remarked that he decided to seek more education after he discovered its importance in industry.

Occupational plans tended to be influenced more by the study of American Industry. (Note Table 8). Of those responding to the follow-up study, 56% reported that American Industry had an influence on their occupational plans. In some instances this influence was dramatic. For example, one young woman responded that her experiences working on an assembly line in

TABLE 8

Influence of the Study of American Industry and High School Courses on Educational and Occupational Plans

Educational Plans

Degree of Influence	*Group*	
	American Industry	*Control*
None	*71.1% (47)*	*52 (13)*
Some, general	*13.6% (9)*	*24 (6)*
Specific, Selection of courses or major	*15.1% (10)*	*24 (6)*

Occupational Plans

None	*43.9% (29)*	*56% (14)*
Gave information on job opportunities	*39.4% (26)*	*32% (8)*
Basic factor in selecting my vocation	*16.6% (11)*	*12% (3)*

an American Industry class were a major factor in her selection of a production line job in a manufacturing plant. (A complete report of the follow-up study is given in Appendix M.)

The data gathered in the follow-up study agreed with the information collected in the interests study. Both investigations revealed that the study of American Industry had an influence on occupational decisions.

Influence on Ability to Think Conceptually

Two separate sets of data were collected in relation to this questions. An instrument with pictorial stimuli was designed especially for this purpose. Also, a multiple choice item was developed for the achievement test. The data gathered by these two techniques will be presented and discussed in the following sections.

Pictorial Stimuli

After considerable analysis of the nature of conceptual thinking and responding, pictorial stimuli representing phenomena in industry were selected as the basis for an instrument to measure the ability to think conceptually. (See Appendix K for the rationale and description of this instrument and the complete discussion of the results.) Four sketches were selected for the test, illustrating people engaged in activities that could be ascribed to industry. Each sketch was general enough to permit the students to project their perceptions into the situation identified. In addition, common attributes were included in the four sketches. For example, each contained at least one person.

The responders were asked to describe as completely as possible what they saw in each sketch. These responses should reflect the influence the study of American Industry has on the students' cognitive structure. After they had done this, the responders were asked to define the common elements in the four stimuli. It was hypothesized that students who were more oriented to conceptual thinking would be able to list more commonalities and identify more subtle attributes. Responses to these items were scored on the basis of (1) fluency - number of unique correct responses, (2) saliency - degree of abstractness represented by the response, and (3) concept labels - the number of times American Industry concept labels were given in the responses.

Comparison of the fluency and saliency scores for items one through four disclosed that in three of ten comparisons the American Industry classes scored significantly higher. Review of the response patterns for each item revealed that most of the patterns favored the American Industry groups. (A detailed discussion of these results is presented in Appendix K.) Thus, there would appear to be some cognitive effect associated with the study of American Industry. Concept labels were used somewhat more frequently by the American Industry students. However, this effect did not appear to be of much greater magnitude than the saliency and fluency effects.

No statistically significant differences were found between the experimental and control groups on the saliency, fluency and concept label scores for the responses to item five, which asked the students to identify the commonalities among the four stimuli. (See Table 9)

Contrasting the average scores on these scales, however, suggests that American Industry may have had some impact on the response patterns. A sub-sample of ten schools was used in this study. In 9 of the 10 schools the American Industry classes had a higher mean score on the fluency scale. Using the binomial expansion formula with P = .5 (based on the hypothesis that there was no difference between the experimental and control groups) reveals that 8 or more comparisons favoring one group would occur less than 5 times in 100.

TABLE 9

Comparison of Mean Response Values for Item Five on the Essay Test

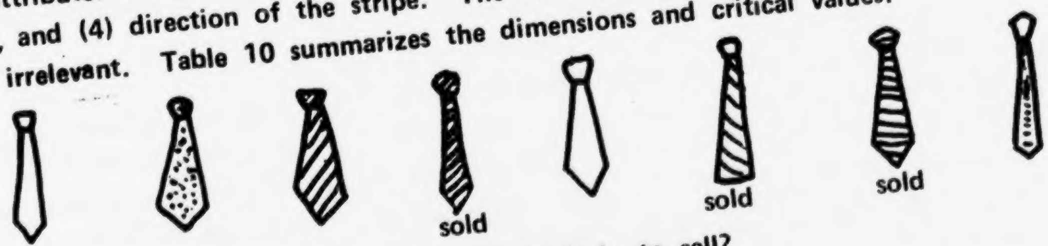
Scale	*Comparison of Means Favors:*		
	American Industry	*Neutral*	*Control*
Fluency	9	1	0
Saliency	6	1	3
Concept Labels	8	0	2

Thus, it would appear that the study of American Industry had an influence on fluency and the use of concept labels.

Multiple Choice Item Additional information on the conceptual thinking capabilities of the students in the evaluation was collected from their responses to the following multiple choice item. A potential problem for the manager of a retail clothing store is posed in the stem of the item.

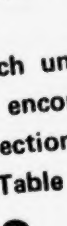
> A clothing store has a number of men's neckties. These ties have different shapes and patterns. The drawings below show several of the ties displayed by this store. If someone has bought a tie just like the one in a drawing, the word "sold" is written below the tie.

The concept which underlies the correct response is "narrow striped ties sell." Four dimensions or attributes are encompassed in the set of neckties: (1) width, (2) decoration, (3) shape of end, and (4) direction of the stripe. The first two dimentions are relevant and the last two are irrelevant. Table 10 summarizes the dimensions and critical values.

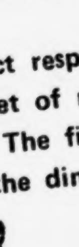


Which of the following will be most likely to sell?

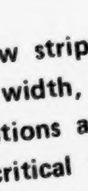
A.



B.



C.



D.

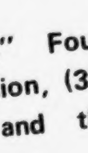


TABLE 10

Relevant and Irrelevant Dimensions and Values in Concept Item

		Values	
	Dimensions	*Critical Value*	*Distractors*
1.	*Width*	*Narrow*	*Wide*
2.	*Decoration*	*Stripe*	*Plain, non-stripe*
3.	*Shape of end of tie*	-	*Square, pointed*
4.	*Direction of stripe*	-	*Horizontal, diagonal*

In 75% of the comparisons, the American Industry class performed better than the control group on this item. None of the differences in performance, however, attained a level of statistical significance when analyzed with chi square. Overall, 70.2% of the American Industry students and 62% of the students in the control group answered this item correctly. Although there were no statistical differences in performance, the trends would seem to indicate a slight effect.

Results on the pictorial essay test and the multiple choice item did not indicate that the study of American Industry had a significant effect on students' ability to think conceptually. Trends in the data suggested some effect but either the effect was too small or the data collection instruments were too insensitive to measure it definitively.

Disadvantaged Students Study American Industry

As mentioned in the ingredients section in this chapter, the Level I American Industry course was designed and developed for average and above average students. During the 1965-66 school year, the American Industry Project had an opportunity to work with disadvantaged groups in two schools. The two settings provided a unique contrast. In one school American Industry replaced industrial arts in a traditional schedule of courses. In the second, American Industry was the core experience for a store-front school.

The study of American Industry met with mixed success in the traditional school. Students were enthusiastic about the enterprise and any profits it generated. The student booklets proved to be difficult to read and many of the learning activity guide sheets did not communicate with the students. The participating teacher in charge of this group was encouraged to make any modifications in the course and instructional materials that he thought would make them more effective. However, his schedule and responsibilities did not provide him with enough time to devise many modifications.

For this school, the achievement test was recorded on magnetic tape and played to the experimental and control groups. In each of the two years the Project worked with this school, the American Industry classes scored higher on this test than the control groups. However, these differences were not statistically significant.

American Industry provided the integrating theme for the learning experiences developed in the store-front school. A small industry was established and the students contracted with local businesses to do packaging and assembly work. Approximately half of the school day was given to work in the student industry. The remainder of the day was devoted to math, communication, and other traditional school subjects.

The industry was managed and manned by students. Each was paid a wage for his time. The tasks and problems encountered while operating the industry were used to stimulate interest in American Industry concepts and in traditional subject matter such as math. For example, when the student has to calculate his wages based upon piece-part rates the value of mathematics became very real and importance of the knowledge attributed in the Projects' definition of industry became apparent.

Observations by the American Industry Project staff and feedback from staff members at the store-front school indicated that the American Industry structure and the enterprise activity were an integral part of this successful educational innovation. The store-front school project drew national attention and recognition.

On the basis of the experience with these two groups of disadvantaged students, the American Industry Project staff concluded that the concepts and structure of knowledges were relevant to educational experiences for the disadvantaged. Also, it was determined that a special instructors' guide, new reading materials, and additional learning activities were needed for successful programs for this group.

Additional Impacts of the American Industry Project

Although the changes in students' knowledges and perceptions reported in the previous section are of prime concern and interest, the American Industry Project has also had some marked effects on the staff members involved in the Project and on industrial arts curriculums. Examples of these effects will be presented in the ensuing paragraphs.

Participating Teachers and Project Staff Members

Participation in the development of the American Industry courses brought attention and recognition to the participating teachers. For example, 80% of the participating teachers reported visitors to their American Industry classes during the 1967-68 school year. During this same year, 45% reported that they had been asked to make presentations on American Industry. Since this time, several of the American Industry teachers have served as resource people at workshops and institutes, instructors for extension courses in American Industry, and speakers at conventions.

Two of the participating teachers decided to study for doctor's degrees during their tenure with the Project. In addition, two more decided to start work on their masters' degrees. Two of the participating teachers joined the Project staff at Stout State University.

During discussions with the participating teachers,almost all of them indicated that their experiences with the Project had been very worthwhile. Some commented that they had gained insight into curriculum development that they would not have achieved without this experience. Others noted that their association with the Project had improved their teaching.

Three of the eight staff members of the American Industry Project decided to study for doctor's degrees during the time they were with the Project. All three have successfully pursued these studies. One has completed his doctorate, another will finish during the summer of 1971, and the third has completed most of the course work. All of the staff members authored journal articles related to their activities on the Project, and most made presentations at national conventions such as American Vocational Association, American Industrial Arts Association, and American Educational Research Association.

Without doubt the American Industry Project had a significant impact on the teachers and staff members associated with it. It stimulated marked professional growth and enlarged the horizons of these men.

Impacts on Stout and the National Scene

Stout State University

A variety of changes and innovations at Stout have been stimulated in total or in part by the American Industry Project. A new degree program to develop American Industry teachers was approved in 1966. Shortly after the bachelor's degree was approved, a special emphasis in American Industry was included as an option in the master's degree in Industrial Education. Also, a new graduate course entitled "Structuring Knowledge" was designed on the basis of the Projects' experiences in developing the conceptual structure on the knowledges of industry.

At the present time, the School of Applied Science and Technology is studying plans for restructuring its departments and the disciplines taught in these departments. The goal of the restructuring is to provide a broad and conceptual study of industry. Thus, it is apparent that the American Industry Project has had a marked impact on Stout State University.

National Scene

During the four years the American Industry Project was funded by the USOE, more than 3000 individuals asked to be placed on the Project's mailing list. In 1968, 198 reader's of the Project's newsletter wrote for copies of two papers announced in the spring edition. These people resided in 37 states, 1 territory, and 2 foreign countries. (See Appendix for the complete study.)

An analysis of the articles published in IAVE in 1958, 1963, and 1966 revealed an increased use of the American Industry concept labels. Numerous visitors stopped in Menomonie to visit with the Project staff. And, papers on various aspects of American Industry were presented at a variety of national conventions.

On the basis of the curriculum changes at Stout and requests for information and presentations, it would appear that the American Industry Project had a significant influence on the local and national scene.

Summary

Evaluation activities in the American Industry Project were carried on in three areas: (1) ingredients, (2) processes, and (3) products. Analysis of the ingredients data revealed that the American Industry instructional materials were valid and logically structured in relation to the Projects' conceptual structure of industry. Information on ability and socio-economic status indicated that students in the American Industry classes represented a cross section of students attending secondary schools.

Feedback from teachers and Project staff members indicated that the American Industry courses were not always taught as designed. In most instances, however, the instructional materials were used in a manner appropriate to their original design. Significant deviations from the course plan and the intent of the instructional materials lowered student performance.

In approximately half of the settings in which the instructional materials were utilized according to their design, the American Industry group scored significantly better than or approached scoring significantly better than $(10 > P > .05)$ the control group. In only one of more than fifty comparisons did the control group mean on the achievement test exceed the mean for the American Industry group involved. Study of American Industry students' responses on an opinionnaire and in a follow-up study disclosed that the study of American Industry had some significant effects on career choice and the students' knowledge of job opportunities in industry.

Additional impacts of the American Industry Project were observed throughout the duration of the Project. Project staff members were encouraged to pursue advanced study. Increasing numbers of references to American Industry appeared in the professional literature and the concepts in the conceptual structure of industry became more prominent in journal articles.

References

Beginning salaries for teachers in big districts, 1950-51 to 1970-71. NEA Research Bulletin, 1970, 48, 83, 86.

Egan, E.M. A study of student attitudes in american industry. Unpublished Master's Plan B, Stout State University, 1966.

Flanagan, J.C., Dailey, J.T., Shaycoft, M. F., Orr, D. B., & Goldberg, I. A survey and follow-up study of educational plans and decisions in relation to aptitude patterns: Studies of the American high school. Pittsburg: Project TALENT, 1962.

Gagne, R.M. The conditions of learning. New York: Holt, Rinehart and Winston, 1965.

Increases in scheduled salaries. NEA Research Bulletin, 1965, 43, 110-111.

Facts on American education. NEA Research Bulletin, 1966, 44. 35-41.

Ranking the States. NEA Research Bulletin, 1966, 44, 11-14.

Tillery, D., Donovan, D., and Sherman, Barbara. SCOPE: four-state profile-grade 9, 1966 - California, Illinois, Massachusets, North Carolina. New York: College Entrance Examination Board, 1966.

SCOPE: four-state profile - grade twelve, 1966 - California, Illinois, Massachusetts, North Carolina. New York: College Entrance Examination Board, 1966.

CHAPTER III

SUMMARY AND RECOMMENDATIONS

Summary

In 1962, a group of Stout State University professors formed a study group to investigate the status of industrial arts and to consider its role in the education of students. Their efforts and ideas provided the basis for the American Industry Project. A Four year research grant from the USOE supplied the resources to complete the conceptual structure of knowledges started by the study group. Also, during this grant, three high school courses were developed, evaluated, and refined.

The conceptual structure was revised and refined through visits to industry and schools of industry. Later it was validated through the comments and reflections of business and labor leaders.

Three courses were constructed for secondary school students: (1) Level I for eighth grade, (2) Level II for ninth and tenth grades, and (3) Level III for eleventh and twelfth graders.

The evaluation system designed for the Project was integrated with the course development process. Information provided by the evaluation was utilized as a basis for making a variety of curriculum development decisions. In addition, data from the evaluation were used to determine the effects of the study of American Industry.

Over 3800 students participated in the evaluation during the three years it was carried on. Approximately 59% of this number studied American Industry. Eighth grade boys comprised about one-half of this sample. Ninth and tenth grade boys were the next largest segment.

The occupations of the fathers of the students encompassed in the evaluation were very similar to those found in a national sample of students. Ability scores reported for the participating students ranged over the complete spectrum found in secondary schools.

With one exception, all of the participating teachers had prior experience teaching industrial arts. Most (71%) had master's degrees. All had an interest in manipulative and physical activities.

A theoretical-empirical approach was employed in developing the instructors' guides. Gagne's work on learning heirarchies and the Project's conceptual structure of knowledges provided the theoretical bases for designing the guides. Field testing and feedback from the teachers produced the empirical basis for revising the guides. The first level guide was revised three times and the second level guide was reworked once. All of the remaining instructional materials were correlated with the guides and evaluated during the field tests.

Although it was not possible to select participating schools and teachers were very similar to those from a sample representative of all secondary schools in the United States. On three variables that have been found to have significant impacts on student performance (1) salaries for beginning teachers, (2) years teaching experiences attained by the school staff, and (3) average per pupil expenditures, there were no marked differences between the American Industry schools and the national sample. Also, it was found that the distribution of occupations of students' fathers was similar to that of a national sample of students.

As noted previously, all of the instructional materials were evaluated as a part of the evaluation system designed for the Project. Results of the teachers' feedback indicated that a detailed teachers guide with correlated instructional media and student materials were essential to an effective course. The student enterprise activity was highly rated by the teachers and students. Also, a need for more activities and methods for utilizing laboratory activities in a manner that contributed to the acquisition of concepts was apparent.

An achievement test was written to supply feedback on cognitive outcomes and to provide a basis for comparing experimental (A.I.) and control groups. In those settings in which the teacher followed the instructor's guide or its intent closely, approximately 40% of the American Industry classes scored significantly higher on the achievement test than the control group. In another 12.5% of the comparisons, the F value for the analysis of variance was between .10 and .05. Again these near misses favored the American Industry classes. None of the control groups scored significantly higher than their American Industry counterparts. And, in only one experimental setting did the control group mean on the test exceed that of the American Industry class. Analysis of the results of the achievement testing revealed that semester classes did not produce as many significant differences as courses which spanned the entire school year.

In a study of interests and attitudes conducted during the 1967 - 68 school year, it was found that American Industry students exhibited a more positive attitude toward industry. In addition, the responses of the American Industry students gave evidence that their study of American Industry had an impact on their knowledge of occupational opportunities in industry and their interest in working in industry. A follow-up study conducted in 1969 with the first group of high school graduates who had studied American Industry (all members of this sample had enrolled in only the Level I course) obtained responses which substantiated the effects the study of American Industry had on occupational behaviors.

Recommendations

Based on the experiences and knowledges accured during the development and evaluation of the American Industry secondary school courses the following recommendations are made.

1. Continue refinement of the structure of industrial knowledges.

2. Review Level I and consider the following revisions.

    a. Add a unit on concept learning to make explicit to the student the mode of thinking and learning required.

    b. Include career exploration activities as a formal aspect of the course.

    c. Revise Unit II - History of Industry.

    d. Incorporate additional material on the environment of industry, especially the societal context of industry.

    e. Revise the student booklets to include more photographs and illustrations and change the names of the characters in the story.

    f. Develop additional activities and alternatives to the enterprise.

3. Refine Levels II and III using the procedures developed for Level I.

4. Refine the procedures for identifying critical phenomena in industry and analyzing them into logical elements of knowledge and performance such as concepts and manipulative operations.

5. Further define procedures and processes for moving from a theoretical structure of knowledges to the design of instructional programs and materials.

6. Develop protocols for American Industry teachers to utilize as they instruct in the affective and cognitive domains.

7. Investigate in further detail what is learned from psychomotor activity.

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Appendixes
For
Final Report

Contract No. OE-5-85-060

Appendixes for
The Establishment of American Industry as a Transitional Subject Between General and Vocational Education

Dr. Eugene R. F. Flug
Dr. Orville Nelson
American Industry Project
Stout State University
Menomonie, Wisconsin 54751

July, 1971

U.S. Department of
Health, Education, and Welfare
Office of Education
Bureau of Research

VT015607
part 2 of 2

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July, 1971

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

U.S. Department of
Health, Education, and Welfare
Office of Education
Bureau of Research

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APPENDIX A

Introduction to Appendixes

Several appendixes were included in this report. This was done to provide in-depth discussions of specific problems, tasks, and research without making the text of this report overly long and tedious to read. Instead, it was decided to provide essential details in the text and place the remainder in the appendixes.

The author of each appendix is noted on the title sheets. Since several writers were responsible for these papers, style and form varies to some degree from one appendix to another. In order to preserve the thoughts and work of each writer only slight editing was done.

Each appendix is paged separately. A letter code is used to identify each appendix and arabic numbers are used to identify pages to the appendixes. Frequent reference is made in the text of the report to the appendixes. These references correlate the text with the appendixes that follow.

Appendix B

American Industry Structure: Development and Validation

by

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Research Specialist
American Industry Project
Stout State University
Menomonie, Wisconsin

June, 1970

American Industry Project
USOE Contract No. OE-5-85-060
Co-Directors:
Dr. Wesley L. Face
Dr. Eugene R. F. Flug

In 1962 a group of faculty members at Stout State University gathered to discuss the content and objectives of industrial arts. This group evolved into an organized seminar which initiated the first steps that were to lead to the conceptual structure of industry which provides the basis for the study of American Industry. Out of the effort of this seminar grew the project funded by the Ford Foundation and the American Industry Project funded by the U.S. Office of Education.

The original conceptual structure of the knowledges of industry is given in Figure 1. Two of the primary inputs into the development of this structure were the theoretical literature related to the attributes and procedures for constructing conceptual structures and the literature on concept learning. Using this information as a framework and guide, the members of the Project and the participating teachers searched the literature on industry and made a number of contacts with people in industry to acquire the information required to delineate this initial structure. Three products resulted from these activities: (1) the major concepts of industry, (2) the structure of knowledges, and (3) a model for each major concept which identified the sub-concepts in the area.

This first structure was then used as a base for the development instructional materials which were tried out in selected secondary schools during the ensuing academic year. At the end of this year the participating teachers and the Project staff, which had now grown to seven members, reviewed the structure and the materials. After corrections were made and the definitions of concepts were revised and refined, a packet was developed for presenting the concepts, concept models and the structure to people working in industry. Interviews were scheduled with a number of individuals connected with industry and with selected university staff members in several universities around the country. Project staff members presented the materials to the person being interviewed and discussed them in some detail with him. Typically only one concept was reviewed with any one interviewee. However, in some cases where the person occupied a relatively high position in the company, for example, the Vice President for Research, two or more concepts may have been discussed. The interviewer did more than place the materials in front of the person being interviewed. Typically, he would present an overview of the project and discuss the conceptual structure. In addition, it was found that the most productive sessions developed when the interviewer had a set of questions based upon the structure that could be used to stimulate the discussion.

As a result of these interviews the concept of public interest was dropped from the original conceptual structure of industry. This action was based upon the comments from a number of the people in industry, management and labor included, that conveyed the idea that public interest was more related to the environment within which industry operated. At this point two environmental rings were added to the conceptual structure. (See Figure 2) The main input for this action resulted from the perceptive comments of Richard Thornbury, Division Director of the Industrial Relations Center at the University of Chicago.

In the spring of 1966, the input from the various consultants was summarized by the Curriculum Specialist and presented to the Project staff. Then each concept was studied in-depth with task force teams comprised of members of the project given responsibility for revising selected concepts. Reports from each of the task forces were presented to the total Project staff and

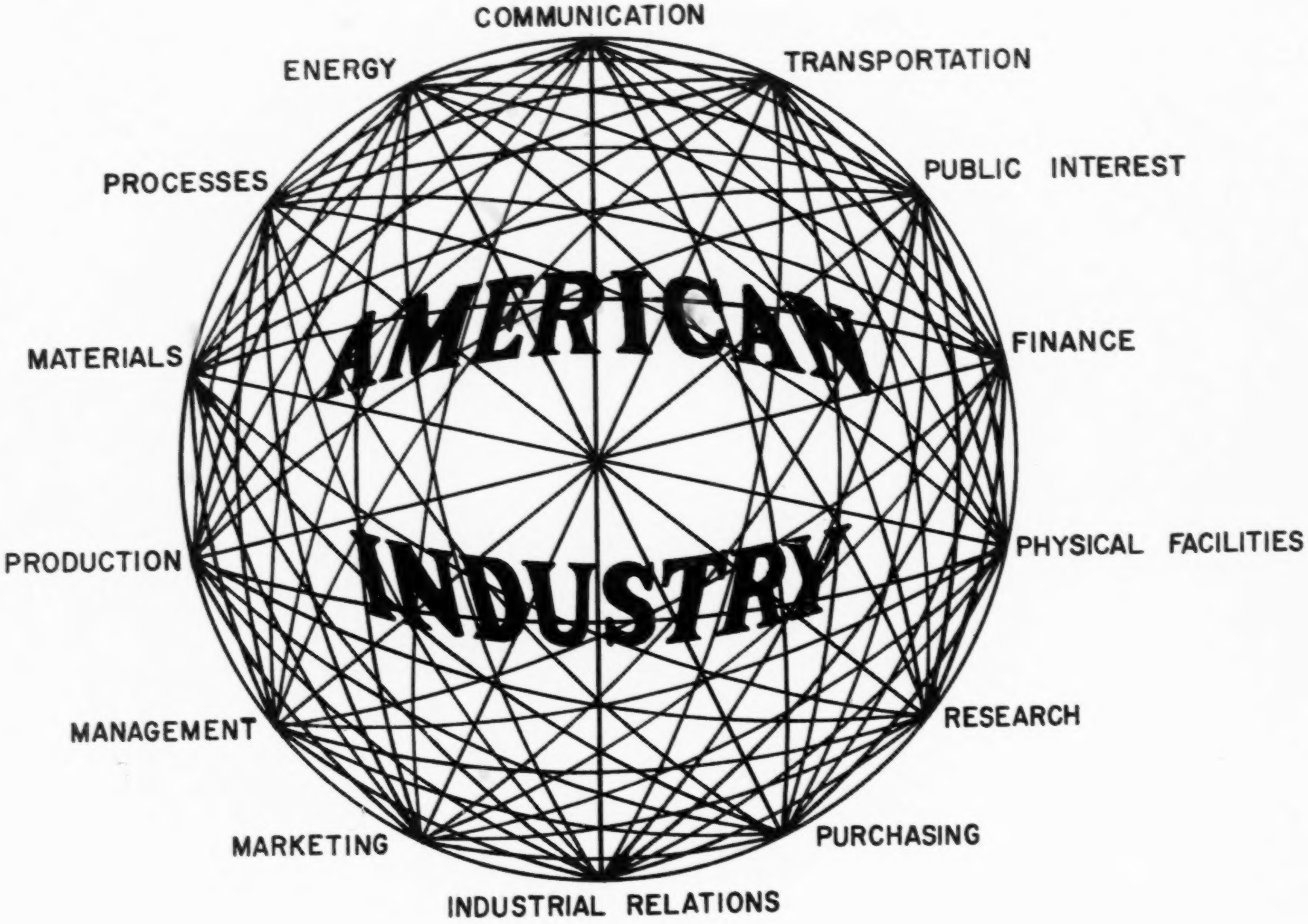
COMMUNICATION
TRANSPORTATION
PUBLIC INTEREST
FINANCE
PHYSICAL FACILITIES
RESEARCH
PURCHASING
INDUSTRIAL RELATIONS
MARKETING
MANAGEMENT
PRODUCTION
MATERIALS
PROCESSES
ENERGY
AMERICAN
INDUSTRY

Figure 1
A CONCEPTUAL STRUCTURE OF THE KNOWLEDGES OF INDUSTRY

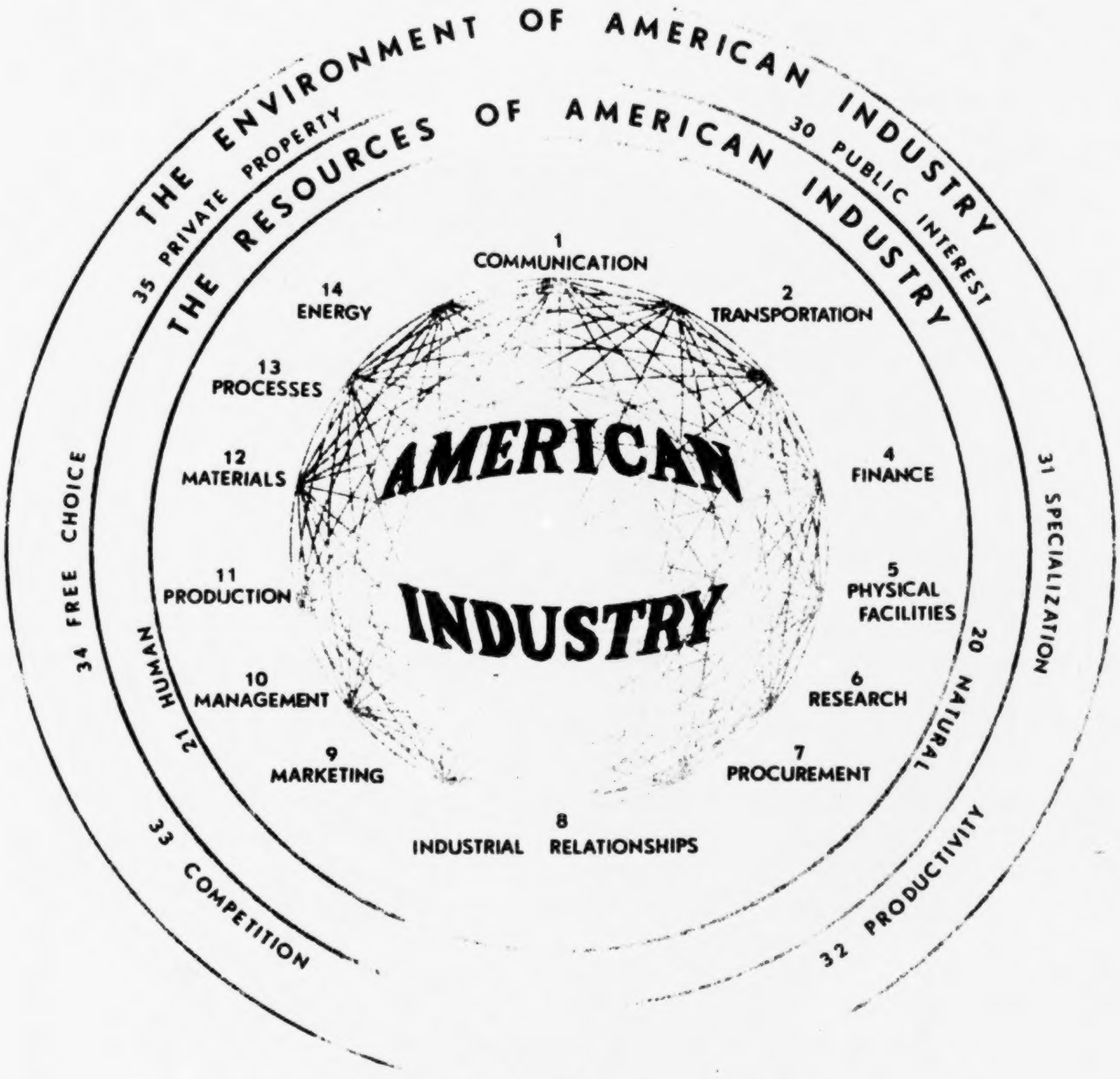
THE ENVIRONMENT OF AMERICAN INDUSTRY
THE RESOURCES OF AMERICAN INDUSTRY
35 PRIVATE PROPERTY
30 PUBLIC INTEREST
31 SPECIALIZATION
32 PRODUCTIVITY
33 COMPETITION
34 FREE CHOICE
20 NATURAL
21 HUMAN
1 COMMUNICATION
2 TRANSPORTATION
4 FINANCE
5 PHYSICAL FACILITIES
6 RESEARCH
7 PROCUREMENT
8 INDUSTRIAL RELATIONSHIPS
9 MARKETING
10 MANAGEMENT
11 PRODUCTION
12 MATERIALS
13 PROCESSES
14 ENERGY
AMERICAN
INDUSTRY

FIGURE 2

A CONCEPTUAL STRUCTURE
OF THE KNOWLEDGES OF INDUSTRY

final revision were determined after the reports had been discussed. Although the project continued to acquire information on its concepts and the conceptual structure, the structure delineated in the stage just described served as the basis for most of the instructional materials developed during the last three years of the Project's grant. (See Figure 3)

Once the final revision of the structure had been completed, the Research Specialist suggested that the structure, the conceptual models, and the definitions of the concepts be presented to a representative group of leaders in industry and labor in order to validate them. New packets of materials, overhead transparencies, and a standard presentation were prepared to present a conceptual structure to this audience. Groups of twenty to thirty individuals were identified and assembled in each of the following regions: Eastern, Upper Midwest, West, and South. A standard presentation was made to each group. (An outline of the presentation is given in Appendix B-A) The same team did not make each presentation. After the presentation and discussion had been completed each participant was asked to complete the American Industry Inventory Form. The items in this form are presented in Table 1.

The American Industry Inventory Form was designed around the significant questions associated with the development of the Conceptual Structure of the Knowledges of Industry. Statements related to the definition of industry, the degree to which the structure reflects industry, and the utility of the structure were presented in Likert format. The responder had six possible responses ranging from strongly disagree to strongly agree plus an N response to be used if a particular area had not been discussed in the presentation.

Preliminary analysis of the data indicated that there were no significant differences between regions, thus, the data were pooled and the summary presented in Table 1 is based upon all of the responses. One of the questions that often has been raised to the Project was concerned with the breadth of the Project's definition of industry. Responses to Item 1 indicate that the Project's definition is valid. On Item 1, 80% of the respondents agreed that the definition is appropriate. Only 11.5% disagreed with the definition. A considerable amount of discussion and input from various sources led to the inclusion of the term profit in the American Industry definition of industry. Responses to Item 3 indicate that 88% of the respondents agreed with that action and about 9.7% disagreed. On the basis of the responses to the first three items, the American Industry definition of industry appears to be valid..

The project's review of psychological literature indicated that a conceptual structure lent efficiency to learning. However, if the structure is to be valid it must accurately reflect the phenomena that it is reported to represent. The response pattern on Item 4 indicated that 73.4% thought that the conceptual structure gave an accurate summary of the major ideas used in industry. About 10.6% disagreed with this statement. Another item related to this is Number 8 which states that the conceptual structure of the knowledges of industry gives one of the best representations of the ideas basic to a successful business that I have seen. The responses to this item indicated that 63.7% agreed with this while 8% disagreed. Items 5 and 7 are also related to the degree to which the structure reflects the knowledges and activities of industry. The structure depicts a relationship between a given concept and every other concept in the structure. Responses to Item 7 indicate that 61% thought that the American Industry structure was valid; 11.5% thought that not all of the concepts were related to each other. The response pattern on Item 5

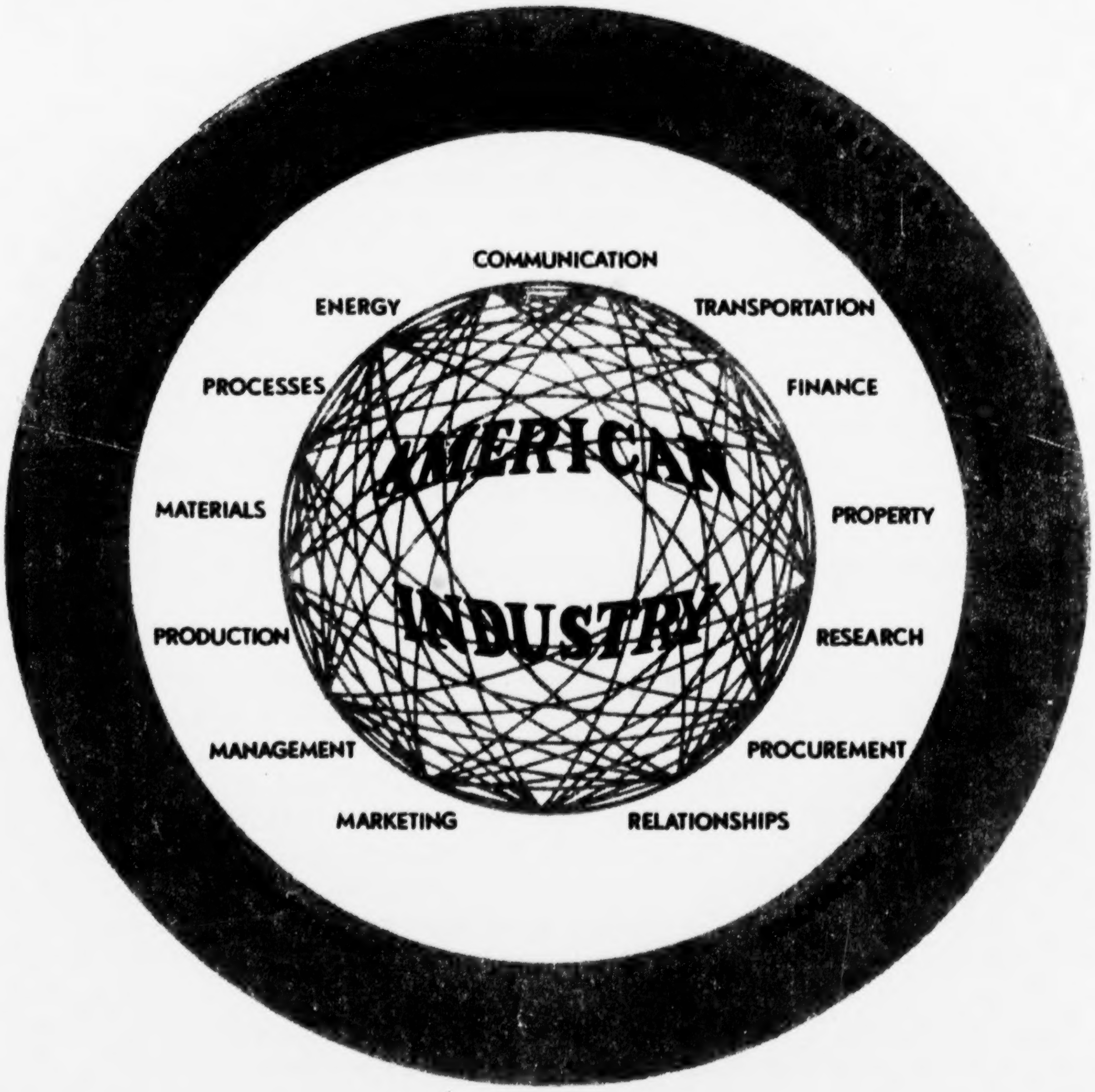
COMMUNICATION
ENERGY
TRANSPORTATION
PROCESSES
FINANCE
AMERICAN
MATERIALS
PROPERTY
PRODUCTION
INDUSTRY
RESEARCH
MANAGEMENT
PROCUREMENT
MARKETING
RELATIONSHIPS

Figure 3

A CONCEPTUAL STRUCTURE
OF THE KNOWLEDGES NECESSARY
TO UNDERSTAND AMERICAN INDUSTRY

TABLE I

Summary of Business and Labor to the American Industry Inventory

		SD	D	U	A	SA	N	NR
1.	Your definition of industry is appropriate	.9*	10.6	4.4	66.4	13.3	0.	4.4
2.	Your definition of industry is too narrow	6.2	47.8	18.8	18.6	2.7	1.8	4.1
3.	There is an overemphasis on profit in your definition of industry	27.4	50.4	6.2	8.8	.9	0.	6.3
4.	The conceptual structure of the knowledges of industry gives an accurate summary of the major ideas used in industry	.9	9.7	10.6	62.8	10.6	.9	4.4
5.	A knowledge of the interrelationships shown in your structure is important in modern business	0.	1.8	2.7	58.4	31.9	.9	4.4
6.	Some of the concepts in your structure have no relationship to the management concept in actual business practice	8.	51.3	18.6	8.8	1.8	2.7	8.8
7.	In actual practice, some of your concepts have no interrelationship with the other concepts on the structure . .	6.2	54.9	18.6	10.6	.9	.9	7.8
8.	The conceptual structure of the knowledges of industry gives one of the best representatations of the ideas basic to a successful business that I have seen	1.8	6.2	21.2	54.	9.7	1.8	5.3
9.	Your models provide a useful tool for understanding each concept area	.9	4.4	9.7	67.3	8.8	3.5	5.3
10.	It is a good idea to discuss the content of each model with people in industry who are knowledgeable in the specific areas	0.	.9	0.	42.5	50.4	1.8	4.4

TABLE 1 (Continued)

	SD	D	U	A	SA	N	NR
11. Present day literature will be of as much help as people in industry in providing ideas for the models and your course content	1.8	39.8	18.6	25.7	5.3	.9	8.
12. Industry people will be the best source of ideas for your models and content	0.	9.7	11.5	47.8	23.9	0.	8.
13. Knowledge of the ideas included in your structure would be of value to all employees in industry	.9	8.8	7.1	54.9	22.1	.9	5.3
14. An understanding of your concepts of industry should make an employee more productive .	2.7	8.	18.6	46.9	15.	1.8	7.1
15. Most entering employees already have an adequate understanding of the knowledges in your structure	38.1	53.1	1.8	1.8	1.8	0.	3.5

supports the value of the relationships shown in the Project's conceptual structure of the knowledges of industry. Over 90% agreed that a knowledge of the interrelationships is important in modern business. In summary the responses to Item 4, 5, 7, and 8 indicate that the conceptual structure is a valid representation of the phenomena of industry.

In order to gain a greater insight into the area defined by each of the major concepts in the structure a conceptual model was delineated for each of the conceptual areas. Item 9 in the Inventory asked the responders to evaluate the utility of these models. Approximately 76% found that they were a useful tool. About 5.3% did not think that the models were useful.

In addition to having a valid representation of the knowledges of industry the Project was concerned that it develop a structure that would have utility to the person who comprehended it. Items 13 and 14 in the Inventory relate to this consideration. Seventy-seven % of the responders thought that the knowledges encompassed in the structure would be of value to all employees in the industry. About 10% of the respondents disagreed with this statement. On Item 14 about 72% of the responders thought that an understanding of the American Industry concepts of industry would make an employee more productive. Approximately 11% disagreed with that statement. The high level of favorable response to Items 13 and 14 indicate that there is considerable utility in the conceptual structure developed by the American Industry Project.

Up to this point the validity of the conceptual structure of the knowledges of industry is apparent, however, if the development and implementation of instructional programs based upon these materials is to be justified there must be some evidence to the effect that there is a need for learning the knowledges encompassed in the conceptual structure. Responses on Item 15 indicate that there is such a need. Over 91% of the responders disagreed with the statement that most entering employees already have an adequate understanding of the knowledges in the structure.

In summary, responses on the American Industry Inventory indicated that (1) the Project's definition of industry was appropriate, (2) the Conceptual Structure of the Knowledges of Industry was an accurate reflection of industrial phenomena, (3) the structure and concepts were important to understanding industry, and (4) the knowledges encompassed in the structure are not held by most entering employees. Thus, it appears that the American Industry Project's definition of industry and its conceptual structure are valid and possess a considerable degree of utility in making the phenomena of industry comprehendable. In addition, there appears to be a need to develop these knowledges in our students.

The activities described in this paper represent the initial steps in validating the Project's structure. Final validation rests upon the influence a conceptual knowledge of the structure has on the learner's understanding of industry.

Appendix B-A-1

Outline of
Industry - Labor Presentation

INDUSTRY–LABOR PRESENTATION

Slide No.	Contents (or Title)	Comments
1	Blank	
2	American Industry Inventory	Discuss how to complete the form
3	Machine Shop	Stout's Curricula
4	Plant planning	
5	Packaging	
6	Fabrics	
7	Art	
8	Blank	Introduce some of Stout's instructional technology
9	Ampex tape deck	
10	CCTV	
11	Blank	Introduce the American Industry Project
12	Title Slide "The American Industry Project"	
13	Change needed, 1962-63	Faculty meetings
14	Project; 1963-64	Ford grant
15	Project, 1964-65	USOE grant
16	Project, 1965-66	Development of materials and 20 secondary schools for tryout
17	Blank	
18	Definition of American Industry	Read definition
19	General Objectives of American Industry	Read objectives

Slide No.	*Contents (or Title)*	*Comments*
20	*Blank*	*Introduce the need for defining our terms*
21	*Guide and hitching post*	
22	*Concept Formation:* *"It's Bedtime"*	*Show how a concept of time develops*
23	*"It's Suppertime"*	
24	*"It's Time To Get Up"*	
25	*"Sometime"*	
26	*"Tomorrow"*	
27	*"Hurry Up"*	
28	*"It's Time To Go To School"*	
29	*"You're Late For School"*	
30	*"30 Days Hath September"*	
31	*"August 18"*	
32	*"Show Starts in 15 Minutes"*	
33	*"Tempus Fugit"*	
34	*"You'll Get 75¢ An Hour"*	
35	*"3 Days Till Friday"*	
36	*"There Goes The Bus"*	
37	*"I'm Late To Work Again"*	
38	*"Breakfast in New York, Lunch in London"*	

Industry-Labor Presentation

Slide No.	*Contents (or Title)*	*Comments*
39	*"1/10 of a Second"*	
40	*"One More Orbit to Re-Entry"*	
41	*"TIME"*	
42	*Definition of a concept*	*Explain attributes*
43	*American Industry Structure*	*Note concepts and interrelationships*
44	*Concepts employed by a carpenter*	*Note how concepts are used in concert*
45	*Concepts employed by a research specialist*	
46	*Blank*	
47	*Definition of American Industry*	*Emphasize the attributes*
48	*American Industry Structure*	*Comment on how all industries are included*
49	*Sources of information for structure*	*Note each*
50	*Sources of information for models*	*Note each*
51	*Production model*	*Models further define each area*
52	*Building the curriculum*	*Rationale and structure provide the basis for the curriculum*
53	*Blank*	*Comment that there are three levels in the secondary curriculum*
54	*Primary objectives - Level I*	*Give each objective and note how they fit together*
55	*Primary objectives - Level II*	

Industry-Labor Presentation

Slide No.	*Contents (or Title)*	*Comments*
56	*Primary objectives - Level III*	
57	*Unit 1 - Industry Today*	*The contents of the first level course. Emphasize how the instructional cycle brings the students in contact with each concept several times*
58	*Unit 2 - The evolution of industry*	
59	*Units 3, 4, & 5*	
60	*Unit 6, The Future of Industry*	
61	*Unit 7, The Student Industry*	
62	*Blank*	*Introduce the development of the first level materials*
63	*Development of first level materials*	*Sequence of activities*
64	*First level booklets and Instructor's guide*	*Products*
65	*Blank*	
66	*Concept of forming - forming roll*	*Referents for a concept of forming*
67	*die casting*	
68	*pan break*	
69	*bending*	
70	*riveting*	
71	*Student planning*	*Students participate in planning to the degree their competencies allow*
72	*Student-Teacher discussion*	*Sample learning activities*

Industry-Labor Presentation

Slide No.	*Contents (or Title)*	*Comments*
73	*Lecture*	
74	*Field trip*	
75	*Blank*	
76	*Consultant response form*	*Data collection forms used in evaluating the Project*
77	*Test question*	
78	*Test question*	
79	*Blank - END*	
80	*Have the participants complete the American Industry Inventory.*	
81	*Collect the completed forms.*	

Appendix C

DESIGNING AND MANAGING THE AMERICAN INDUSTRY EVALUATION SYSTEM

by

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Research Specialist
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Menomonie, Wisconsin

For

The AERA Convention
Los Angeles, California
February, 1969

American Industry Project
USOE Contract No. OE-5-85-060
Co-Directors:
Dr. Wesley L. Face
Dr. Eugene R. F. Flug

DESIGNING AND MANAGING THE AMERICAN INDUSTRY EVALUATION SYSTEM

Introduction

During the past three and one-half years, the American Industry Project has been funded under Section 4C of the 1963 Vocational Education Act to develop a set of curriculum materials for secondary schools and institute a teacher education program for this curriculum. My comments today will be concerned with the evaluation system developed for the Project, some of the techniques utilized to design it, and a sample of the management tactics used to monitor and control the system.

Keep in mind that this system was designed for a specific project. Thus, in its present form, the evaluation system may not be appropriate for other projects or applications; however, the principles and concepts used in its development should be of value to those concerned with the construction and evaluation of curriculum materials and learning systems.

The American Industry Evaluation System

One of the primary purpose of the American Industry Project was to develop a curriculum based on the study of industry. Industry as used in this context is a generic term. It includes the various businesses and enterprises which produce and market goods or services to satisfy the needs of their customers and attain a profit for themselves. The American Industry secondary school courses are designed to be transitional subjects between general and vocational education. Their objective is to involve the student in learning experiences which asist him to make appropriate vocational decisions, to comprehend his role in our industrial society, and to be a productive member of society.

In order to understand the vast number of activities and knowledges utilized by industry, the conceptual structure of the knowledges of industry depicted in Figure 1 was developed and refined. The basic elements in this structure are the concepts of industry. Interrelationships between the several concepts complete the structure. On the inner ball are listed the concepts used directly by industry to achieve its objectives. Concepts in the ring represent the environment in which industry operates. These concepts interact with those on the ball.

Four basic rules were established for designing the American Industry courses. First, these courses focus on the study of industry. Second, the structure of industry shown in Figure 1 provides the basis for this study. Third, inherent in these courses is the study of the concepts of industry. And, fourth, provisions for problem solving experiences are included in the learning activities.

Three secondary school courses are being developed on the basis of the structure of the knowledges of industry and the four rules just listed. In the first course, the student is introduced to the basic concepts of industry and has the chance to solve some simple industrial problems.

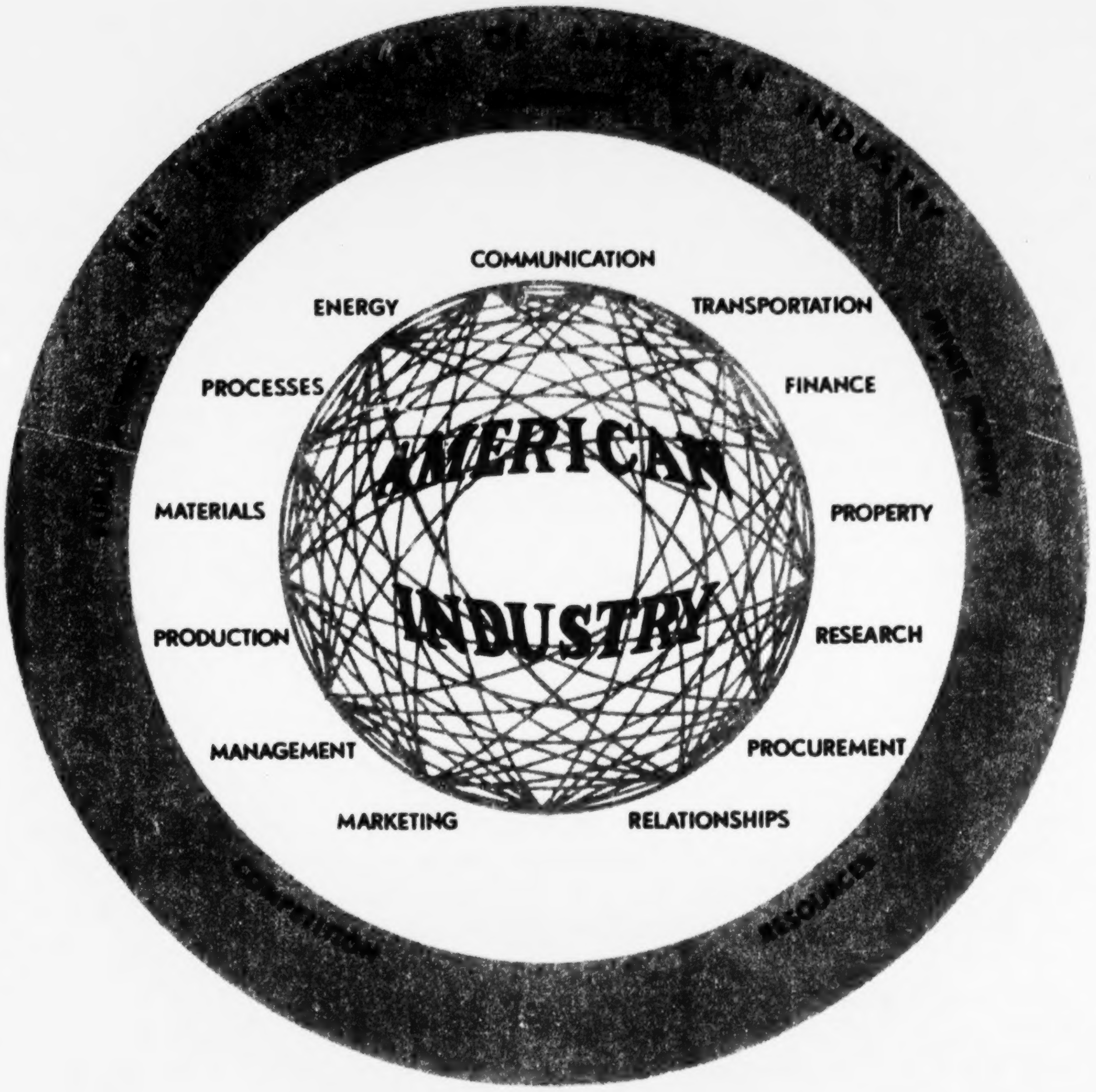
INDUSTRY
COMMUNICATION
ENERGY
TRANSPORTATION
PROCESSES
FINANCE
AMERICAN
MATERIALS
PROPERTY
INDUSTRY
PRODUCTION
RESEARCH
MANAGEMENT
PROCUREMENT
MARKETING
RELATIONSHIPS
COMPETITION
RESOURCES

Figure 1

*A CONCEPTUAL STRUCTURE
OF THE KNOWLEDGES NECESSARY
TO UNDERSTAND AMERICAN INDUSTRY*

The second course presents each concept in greater detail and depth. Sub-concepts have been defined for each concept and these provide the structure and resources for the second course. In addition, the student becomes more involved with the actual sequences of events and activities found in industry and he has the opportunity to solve more complex problems. The third course is designed for individual study. Each student is encouraged to select a suitable problem and to then study it in terms of the conceptual structure of industry.

The first course is being developed for the seventh and eighth grades. Target population for the second course is grades nine and ten. The third course would be open to eleventh and twelfth grade students. Both boys and girls can enroll.

During the past three years, the American Industry Project staff has devoted part of its time to delineating and refining the structure of the knowledges of industry. In addition, a sub-group has been working on the three secondary courses just described. The research specialist has been a member of this second group and the evaluation system described in succeeding paragraphs was developed to meet the needs of these people.

Two general objectives guided the distillation of this evaluation system. First, it had to provide research data related to the effectiveness and outcomes of the instructional materials, learning activities, and instructional sequences used in the American Industry courses. Second, the information required for the management of the curriculum development activities and the evaluation also had to be provided. Fortunately, these are compatible objectives. In fact, as will be seen later, they complement each other quite well. The evaluation domains and the research and the development strategy presented in the ensuing comments were designed to attain these objectives.

Evaluation Domains

Data are collected in three domains in the evaluation system. These domains are entitled ingredients, processes, and products. The ingredients domain includes all of the input variables in a learning situation. Some typical inputs are the nature of the teachers, the characteristics of the students, and the quality of the instructional materials.

As a unit of instruction or course is being taught, a number of teaching-learning processes interact with the ingredients and with each other. Teachers try out new materials and ideas with students who have diverse abilities and interests. Students encounter new concepts and activities. And, the teacher's colleagues may react to the new curriculum. These activities and interactions are encompassed in the processes domain. This domain is concerned with the ongoing activities and responses associated with teaching and learning within the school environment.

The last domain is comprised of the outcomes or products of the study of American Industry, This domain is concerned with the characteristics of the student at the end of the course, the impressions of the teachers, the reactions of administrators and staff members at the participating schools, and opinions of the parents. Follow-up data are also a part of the products domain.

These domains are presented in graphic form in Figure 2. The horizontal lines connecting the three domains symbolize the interrelationship that exists between them. Moreover, they portray an interaction and sequence of events that is essential to establishing causal relationships. These relationships are especially vital in continuing developmental work. Without the reasons for what happened, it is very difficult to make modifications and refinements in curriculum materials and procedures.

A look at some of the data collected in each area may help to clarify the scope of each domain. In the ingredients domain, for example, the structure and sequence of instructional units is ascertained and the reading level of the student materials is measured. Participating teachers fill out biographical data forms and the students complete information forms. Students also complete a questionnaire based on Project TALENT'S Student Information Blank. Guidance counselors furnish ability scores for students, and administrators provide statistics on their school system. Data on the home communities of the participating schools are secured from documents and observation.

Processes are evaluated through the use of opinionnaire forms, observation, and communication with the participants. Teachers react to each lesson a standard rating sheet placed at the end of each lesson and unit. Students express their opinions on a rating form devised for this purpose. In addition, the Project's supervisor of participating teachers makes regular visits to each school to observe the use of the materials and the progress of the course. He observes classes and discusses the courses with the students, participating teachers, and administrators. Other members of the Project staff also visit the schools as the opportunity arises.

Another source of processes data is the condition of the instructional materials supplied by the Project. For example, booklets that are clean and have tight bindings indicate that they were used little, if at all.

Outcomes from the study of American Industry are measured in several ways. Students complete an achievement test which measures their ability to apply the concepts of industry to situations and problems found in industry. They also complete an opinionnaire which provides a measure of their attitude toward industry. Reports, written and verbal, by the participating teachers give evidence of changes in their thinking. Even more revealing are the curriculum and laboratory plans they develop after participating in the program. Effects on the schools are noted by changes in curriculum expansion of American Industry offerings, and requests for information to the Project.

The relationship between the three domains can be seen in the following example involving the evaluation of the student booklets produced by the Project.

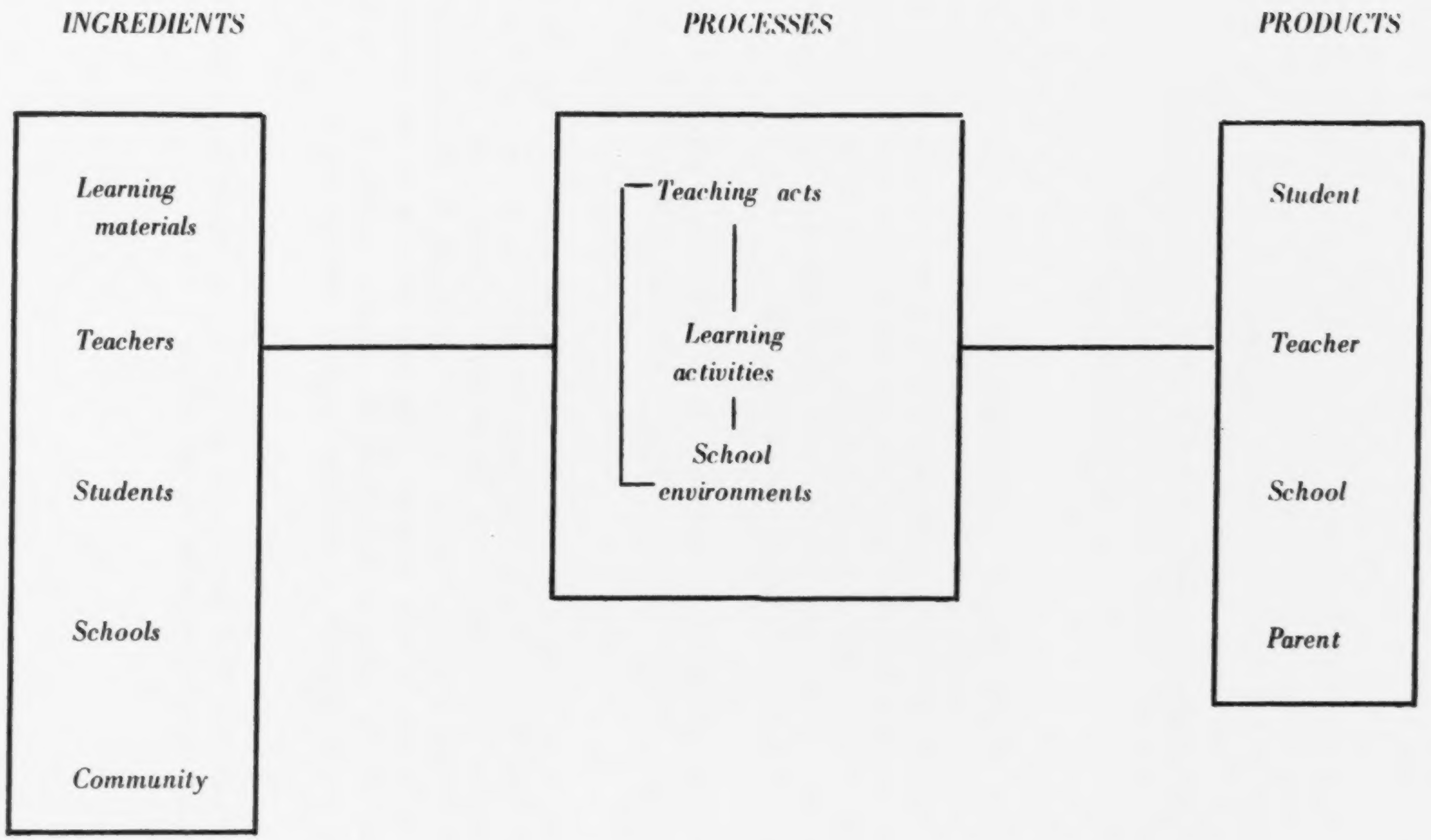
INGREDIENTS
Learning materials
Teachers
Students
Schools
Community
PROCESSES
Teaching acts
Learning activities
School environments
PRODUCTS
Student
Teacher
School
Parent

Fig. 2. Evaluation Domains in the American Industry Project

Ingredients	Processes	Products
Reading level of each booklet (Dale-Chall formula)	Teacher description of the use of the booklet (Feedback form)	Student achievement (Project's test)
Reading ability of the students (Reading tests)	Supervisor of participating teachers observes classroom use of booklets and questions students	Student opinions of reading level and contents (Rating form)
Interests of the students (Student Questionnaire--adapted from Project TALENT'S SIB)	Students indicate how much they read (Rating form)	
Concepts in the booklet (Based on the Project's structure of industry)	Research specialist reviews signs of usage on individual booklets.	Teacher opinions of booklets (Feedback forms)

If a student says that a booklet is difficult to read, his reading score can be compared with the reading level of the booklet. Then his interests can be considered. Also, the use made of the booklet by the teacher can be included as another factor.

During the past three years, approximately six thousand students have been entered in the Project's data file and about six million bits of information have been collected. Arrangements were made with the administration in each participating school for the data collection procedures, the types of information to be collected, and the security measures to be employed by the Project. In brief, the Project guaranteed that it would not name individual students in its report and that it would not connect specific schools or teachers to results in its reports without prior approval of the schools and people involved.

The information collected is channeled to the research specialist for analysis, interpretation, and storage. Most of this information is relayed to a key puncher and is placed on tab cards. The original document is retained and the data card is filed for further processing.

Data gathered in the evaluation are used to make a number of comparisons. For example, differences in achievement and attitudes of American Industry students and control group students are analyzed. Teacher evaluations of new instructional materials are contrasted with their ratings of the materials replaced, and with other instructional resources used in the course. Experimental designs are used when possible; however, in some schools quasi-experimental designs have to be employed. Within school comparisons and interpretations of results are made within the context of the design used. Since schools were not randomly selected, nor formal between school comparisons are made.

The fact that the Project is continuing its development work over a period of years has provided the opportunity to analyze data gathered during several school terms. Increments or decrements in performance can be noted on the basis of previous results in the same setting. In addition, the effects of changes in instructional materials and learning activities can be assessed by their influence on performance trends

To a large extent, the information collected and the results of the comparisons are germane to the work of the curriculum specialist. Hence, the research specialist has worked closely with him to determine his information needs. Then as the data are analyzed, the curriculum specialist receives the results and discusses them with the research specialist.

Research and Development Strategy

As noted previously, one of the basic objectives of the American Industry Project was to develop and evaluate curriculum materials for American Industry courses. This objective has structured the research and development strategy designed for use with the evaluation domains. Although the evaluation domains identified in Figure 2 suggest specific sources of data, decisions must be made on the segments of the course to be evaluated, the types of information to collect, and the data collection schedule.

Figure 3 gives a graphic representation of the research and development strategy employed. At the left is a representation of the Project's structure of the knowledges of industry. This structure together with its accompanying rationale defines the guidelines and the boundaries within which the research and development work is carried on. The solution axis is indicated by the horizontal line enclosed in the spiral line which depicts actual results.

The successive spirals, each with a smaller radius from the solution axis, symbolize two essential elements in the strategy. Instructional materials, evaluation techniques, and other products are developed and approved on the basis of an evaluation of how they function in the setting for which they were designed. The successive spirals indicate that this will probably require more than one trial, and that the results from the prior trial will be the basis for the revisions for the succeeding trial. In addition, the decreasing size of the spirals indicates an improvement in performance. This denotes the value of appropriate feedback from the preceding spiral and effective use of this information.

Progress toward the maximum solution during a spiral becomes less for each succeeding cycle. In other words, improvement becomes more difficult as the research and development cycles progress. The relationship between the distance traversed by each successive spiral is given by $X > Y > Z$.

The implications arising from this relationship are very important. Given a fixed amount of human and financial resources, progress will be less marked in later research and development cycles. Hence, operating under the usual conditions, in which these two commodities are scarce, required judicious selection of the curriculum programs and products to be further developed and evaluated.

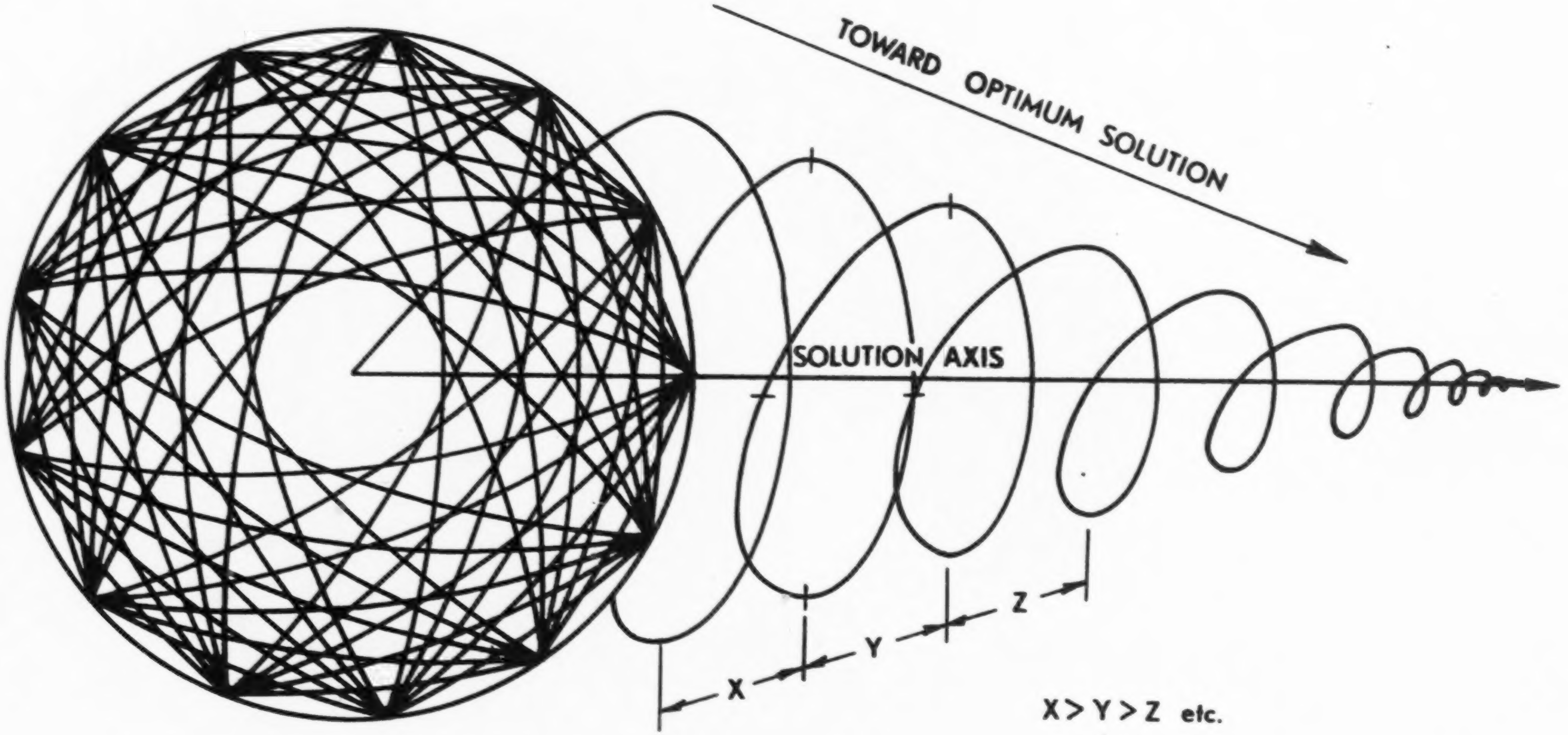
TOWARD OPTIMUM SOLUTION
SOLUTION AXIS
X
Y
Z
X > Y > Z etc.

Fig ure 3. *Research and Development Strategy* [a]

[a] *The research specialist is indebted to Dr. Martin I. Taft, President of Socio-Economic Systems, Inc. Los Angeles for the idea for this graphic representation of the projects research and development strategy.*

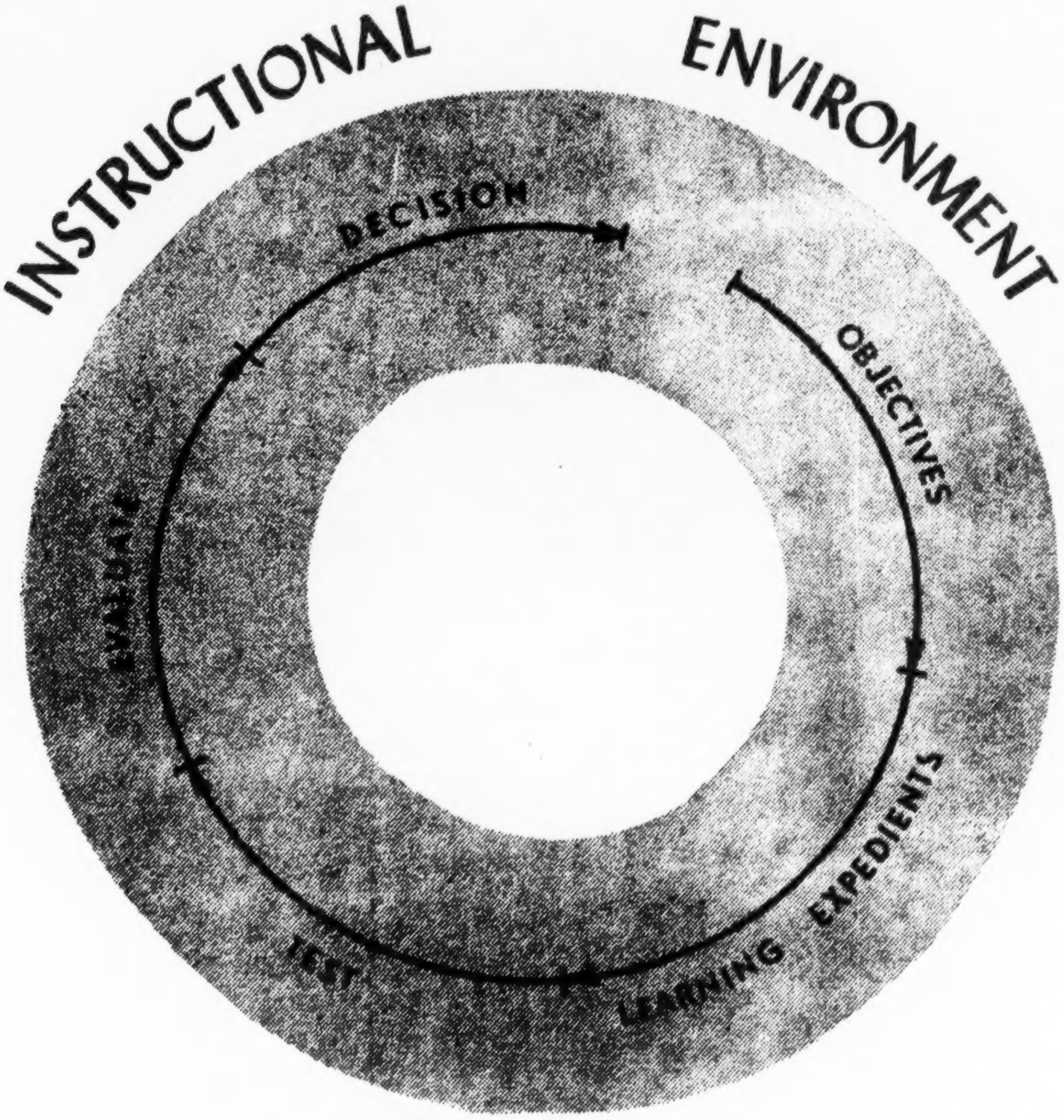
INSTRUCTIONAL
ENVIRONMENT
DECISION
OBJECTIVES
EXPEDIENTS
LEARNING
TEST
EVALUATE

Fig. 4 A Specific Research and Development Spiral

In solving this problem on the American Industry Project, systems concepts were applied to the curriculum development work. An inventory was made of the components of the system and their interrelationships. After this, the problems associated with these components and interrelationships were reviewed to determine how critical they were in terms of reaching the Project's goals and the ramifications of solving or not solving them. This gave a basis for attacking a sub-set of problems whose solution would have maximum effect. As used in this context, solution means an improvement in the conditions causing the problem. This improvement might require one or more research and development spirals. However, after each spiral, the new mix of problems was reviewed to determine if development should continue on the same problems or whether attention should be given to others. The result of using this approach means that no one element of the curriculum will probably be devloped to its maximum potential. Rather, all or most elements will be developed to maximize the functioning of the curriculum.

As mentioned previously, this research and development, strategy can be utilized to evaluate and develop curriculum materials, research procedures, or teaching methods depending upon the needs of the moment. The procedure used to develop the curriculum materials is depicted on the spiral reproduced in Figure 4. Five steps are encompassed in this procedure. The first step is to define in as concise terms as possible the objectives for the segment of instruction to be developed. After this has been done, learning expedients can be procured or constructed to meet the objectives for the segment of instruction to be developed. After this has been done, learning expedients can be procured or constructed to meet the objectives. The next portion of the R & D cycle involves use of the expedients in an appropriate instructional setting.

Data are collected prior to, during, and at the end of this tryout. The evaluation domains help define the areas in which to collect data and the criterion products selected will assist in the process of determining what ingredients and processes data to collect.

The red bank around the cycle depicts the environment in which the steps are carried to completion. This environment interacts with these activities and may facilitate or hamper their accomplishments. For instance, if the tryout groups are comprised of high ability students, instructional materials will probably perform rather well. However, the same materials may fail to function well with students of lower ability. Thus, the results of the test must be interpreted in light of the environment in which they were obtained. The ingredients and processes domains supply the data for assessing the characteristics of this environment.

A spiral may be broken into other activities for different phases of the development work. For example, in developing the evaluation system, the second step in Figure 4 would be replaced by the design of the evaluation system or sub-part of the sytem.

Designing the System

The evaluation system just described was evolved during the past three years. In fact, it is still being refined and extended. This evolution was a planned part of the development sequence for the system. Specific provisions for this process were built into the system and its rationale. To date, this approach has worked effectively.

Evolution was a necessary and logical procedure for the American Industry Project. At the start of the Project, the staff and the participating teachers had a limited amount of experience with research and development work. Moreover, there was a limited amount of time and money available for research and evaluation. Consequently circumstances--at least to some degree--prescribed this course of action.

Gradual development provided the time and the opportunity for the people in the system to grow with it. As a result, they were prepared to handle new concepts and procedures as these were put into effect. In-service training and experience with the evaluation system provided the basis for this controlled growth.

Another factor that makes it necessary to evolve an evaluation system is the fact that it is difficult in the first stage of a project to envision all of the information that will be required and the operating characteristics of the evaluation procedures employed. An evaluation of data gathering technique can be developed only to limited degree before empirical evidence will be needed for its further refinement. This is especially true when a number of teachers with varied knowledge and attitudes are encompassed in the system. Initial experiences provide the information for the decisions that are required to continue the development of the evaluation system.

Designing an evaluation system is not a simple task. Hence, the planner should utilize as many of the modern planning techniques as possible. The following, for example, have been instrumental in the development of the Project's evaluation. Network analysis has helped to reveal the sequence and contingencies in the activities required in the R & D work. Tree charts have been an aid in defining the consequences of a chain of decisions. Systems analysis techniques have played an important role in analyzing an organization which contains a number of elements working toward a common goal. Symbolic models have been used to assist the process of conceptualizing the evaluation system.

Construction and use of symbolic models have been especially helpful in designing the evaluating system. A model assists in reducing the information related to the design of the system to a set of manageable and meaningful concepts set in a logical structure. In addition, thinking is aided by the symbols provided for the basic variables, concepts, and interactions identified in the model. These symbols can be manipulated mentally to deduce specific evaluation procedures and activities.

The model building process is a fine blend of a knowledge of the final objectives for the evaluation system, the ability to generate ideas and ways to achieve these objectives, and intuition. However, the process is self-supporting to a degree in that it challenges the clarity and validity of the objectives used in developing the model and stimulates thinking.

One means utilized to stimulate ideas and fortify intuition has been the application of Macia's work which relates retroduction and theory models to theory building in education (Macia 1962) In brief, the procedure involves the use of an existing theory or law as the basis for a model which in turn provides a framework for a theory concerned with the area being studied. The source theory may be found in the same discipline as the problem or in other disciplines.

The process of conceptualizing the environment that surrounds the cycles in the research and development strategy show in Figure 4 provides an illustration of the use of this approach. After selecting the spiral line to represent the R & D strategy, I proceeded to consider the detail of each spiral. Actions and their sequence were then derived without too much difficulty. However, at this point there was still a feeling that the spiral was incomplete in that it did not suggest how the ingredients and processes data were related to the activities on the spiral. During the time this problem was being contemplated, the theory associated with conductors in magnetic fields came to mind. As the ingredients, processes, and products variables were related to this theory, it became clear that there were many similarities. Intelligence of the experimental students, for example, could support or hinder the performance of instructional materials in the same manner that the direction of the magnetic field can facilitate or impede the flow of electrical current through a conductor. Thus, the environment component of the R & D strategy was developed with the electrical theory providing the model.

Other source theories might have been just as appropriate. Ecology, for instance, could probably provide one or more source theories. However, my training made me more aware of the electrical theory and it proved to be of value. Note that this source theory "proved to be useful. There is no guaranteee that source theory will be appropriate. The resulting model or formulation must be tried out and evaluated.

Effective communication is another problem to consider when designing the system. Participating teachers, guidance counselors, students, and administrators will have some degree of involvement in the evaluation. Incorrect responses or inaction may make the task of evaluating more difficult and time consuming and could mean the complete loss of some data.

Systems analysis procedures have helped to define the components and interrelationships in the Project's evaluation system. Communications theory has been an important aid in developing communication within the system. Messages are constructed to fit the situation and the receiver. Also, a procedures guide was written for the teachers, brochures on the evaluation have been distributed to the participating schools, and part of the Project's in-service workshop schedule has been devoted to discussing the evaluation in order to make the receivers more knowledgeable of the evaluation activities. In addition, care is taken to contact the appropriate people in terms of their function in the school and need for the information in question.

Feedback from the communication network brings information for the evaluation and discloses the interference in the system. Hence, the person managing the evaluation must monitor the feedback and determine what changes need to be made.

Managing the Evaluation System

Responses to each communique, evaluation instrument, and procedure should be reviewed.

Initial responses to any new technique or procedure need to be analyzed very carefully. Embedded in this feedback will be the clues for possible revisions or information to substantiate the continued use of the original procedure. An example of this process is found in the review of a problem related to the distribution of information gathering forms to the participating teachers during the first year of the Project. These forms were to be administered by the teachers during the school year. The decision was made to give all of the forms to the teachers at the beginning of the first semester. Sufficient quantities of each form were placed in labelled file folders and given to the teachers at the end of the summer session workshop.

The first form was administered during the initial week of school. All teachers returned these to the Project on time. The second form was to be administered periodically during the school term. Most teachers accomplished this; however, several "ran out of forms". The last form was to be completed by the students at the end of the term. Again, most teachers had done this correctly. However, the sheets returned by one teacher contained some copies of the Project's forms, copies of a somewhat similar form used by his school, and several sheets that did not relate at all to the information being collected.

Actually, there was evidence of problems with this mass distribution procedure prior to the final returns. Earlier in the year I had occasion to visit each teacher. During these visits, it was observed that some of the teachers had not removed these forms from the box in which they received them. Moreover, in one case, the box was under several other items. The mass distribution procedure was based on the assumption that the teachers would file the forms. In practice this assumption was not met in all instances. The Project now mails the forms just prior to the time they are to be administered.

Two important points are found in this illustration. First, it is worthwhile to go "where the action is". My visits to participating centers have been invaluable in determining the operating characteristics of the participating teachers and the environment in which they work. Second, the effects of decisions have to be assessed. This review will indicate if changes should be made and it will also reveal some of the characteristics of the people influenced by the decisions.

Continuous review of past decisions is an integral part of the R & D strategy described previously. If this procedure is to be effective, initial and subsequent decisions must provide for flexibility in later actions. In the example given, there was little difficulty in changing the original decision. An alternative course of action was available and there were no psychological ramifications. This would not necessarily be true, however, of other decisions. Suppose, for example, that in the initial stage of the Project the teachers were assigned the responsibility for the complete evaluation of the American Industry courses without any intervention from the Project staff. How could this decision be changed without significantly disrupting the developmental and evaluation activities?

A basic rule in this instance is to not consider previous decisions, whether made by you or others, as proven facts. Error can be present in decisions as well as in data. The very fact that decisions have to be made indicated that there are feasible alternatives and no certain course of action. Thus, it would be a good idea to keep a log of the various alternatives considered when making a decision and to indicate the degree of certainty associated with the one selected. This would be extremely helpful when the decision is reviewed at a later date.

Decision makers must also be aware of the psychology that permeates the system. Response hierarchies and capabilities need to be determined. Rewards that effectively motivate actions should also be taken into consideration. Then this information has to be used in the decision making process.

As evidence by the decision making procedures just described, efficient management of the evaluation system is dependent upon sufficient quantities of valid and reliable information. In all likelihood, the decision maker will have less data than he desires, however, he must have some if his decisions are to improve the state of affairs. Lack of pertinent data adds more risk to the decision process. However, this lack should stimulate further development and refinement of the data gathering carried on in the evaluation.

Summary

In summary, the evaluation system utilized by the American Industry Project was designed to generate both evaluation data and information related to the management of the research and development activities. Experience with the system has demonstrated that management information is essential to the development work and the activities involved in collecting it are compatible with typical evaluation activities and helps to determine the factors associated with given outputs.

Three domains, ingredients, processes, and products are encompassed in the Project's evaluation. These domains provide the framework for evaluating the various learning materials produced. In addition, a cyclical research strategy is employed to provide for effective use of the data gathered in these domains. The feedback from an initial tryout of instructional materials provides a basis for further refinements.

During the past three years, the Project's evaluation system has evolved into its present dimensions. The evaluation system was designed to provide for this growth so that the people in the system could mature with it. Also, past decisions and evaluation procedures are periodically evaluated to determine whether they are appropriate in light of the current status of the developmental work.

BIBLIOGRAPHY

Campbell, D. T., & Stanley, J.C. Experimental and quasi-experimental designs for research on teaching. In N.L. Gage (Ed.), Handbook of research on teaching. Chicago: Rand McNally & Company, 1963, 171-246.

Dailey, J.T. A system for classifying public high schools. In J. C. Flanagan (Ed.), A survey and follow-up study of educational plans and decisions in relation to aptitude patterns: studies of the American high school. Pittsburgh: Project TALENT, 1962, Ch. 4, & Appendix A.

Dale, E., & Chall, Jeanne S. A formula for predicting readability: instructions. *Educational Res. Bull.*, 1948, *27*, 37-54.

Face, W.L., & Flug, E.R.F. The establishment of american industry as a transitional subject between general and vocation education. American Industry Proposal to USOE, Stout State University, Menomonie, Wisconsin, 1965.

Flanagan, J.C., Davis, F.B., Dailey, J.T., Shaycoft, M.F., Orr, D.B., Goldber, I., & Neyman, C.A., Jr. *The identification, development, and utilization of human talents: the American high school student.* Pittsburgh: Project TALENT, 1964, Ch. 5.

Miss E.S. Macia, *Models and the meaning of 'Retroduction.'* Bureau of Educational Research and Service, Ohio State University, 1962.

Stake, R.E. Countenance of educational evaluation. Center for Instructional Research and Curriculum Evaluation, University of Illinois, 1966. (Mimeographed)

Webb, E.J., Campbell, D.T., Schwartz, R.D. and Sechrest, L. *Unobstrusive measures: non-reactive research in the social sciences.* Chicago: Rand McNally & Company, 1966.

Appendix D

DEVELOPING AMERICAN INDUSTRY COURSES FOR THE SECONDARY SCHOOL

by

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March 1968

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DEVELOPING AMERICAN INDUSTRY COURSES FOR THE SECONDARY SCHOOL

Introduction

The dual task of constructing a conceptual framework of industry in the United States and developing a completely new secondary curriculum based upon that framework might be described as a monumental undertaking. The challenges implicit in this undertaking have been accepted by the American Industry Project and the description of this effort forms the substance of this paper. A teacher education program has also been designed and pilot tested for this new area of study. The material to be presented, however, considers only the conceptual framework and the development of the secondary program called American Industry.[1]

Major emphasis is placed upon:

A. The need of the secondary school to aid all people in developing an understanding of American industry.
B. The procedure used in identifying those knowledges necessary to understand American industry.
C. The specification of behavioral objectives, taxonomically structured.
D. The development of a logical course sequence.
E. The development of instructional materials for teacher and student.

Rationale

The American Industry Project is in the process of developing a secondary school curriculum which focuses upon the knowledges necessary to understand American industry. With the forces that American industry exerts in the molding of our society, it must be recognized as basic to the American way of life.

Technological advancements of industry affect our lives daily. New processes demand unique and more complex cognitive and manipulative skills. Labor saving products create new opportunities for thought and leisure. Automated machines using sophisticated electronic equipment result in efficient mass production. These changes are examples of how American industry interacts with society. It is also apparent that students are affected and must understand those forces which influence their lives. American industry has been identified as one of those forces and must be studied in order that students have an adequate understanding of their environment. Since American industry touches the lives of all people in our society, it is felt that American Industry courses are a part of general education.

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[1] In this paper American industry refers to the enterprises found in the United States that exist for the purpose of making a monetary profit. American Industry refers to the courses being developed by the American Industry Project.

The American Industry program is centered about two broad objectives:

A. To develop an understanding of those concepts which directly apply to industry.
B. To develop the ability to solve problems related to industry.

As a basis for meaningful curriculum development, it was necessary to identify a logical structure of generalized knowledges of industry. A conceptual structure for these knowledges was selected for four basic reasons:[2]

A. Simplicity is provided, making details meaningful and more easily remembered.
B. Conceptual organization provides a stable way of structuring knowledge.
C. Relationships are revealed, which in turn provide a unity of knowledge.
D. Conceptual understanding allows for transfer and the application of knowledge to various situations.

The starting point for the development of the structure involved the formulation of a definition of American industry. Care was taken to use defining attributes which lent themselves to conceptual analysis. The Project formally defined American industry as:

> "an institution in our society which, intending to make a monetary profit, applied knowledge and utilized human and natural resources to produce goods or services to meet the needs of man."

A conceptual structure of the knowledges necessary to understand American industry was then developed. The structure consists of two sub-sets of concepts:[3] (1) those concepts which apply to any industry regardless of product or service and (2) those concepts of our society that directly influence American industry in a manner that gives it a uniquely American character. (Figure 1) After this had been completed, conceptual models and definitions for each concept were developed.[4] The production model is graphically presented in Figure 2 as an illustration. Production was defined as "those activities of an enterprise which are primarily concerned with the generation of specified goods or services." Each concept and sub-concept was defined similarly in terms of their respective attributes. This total structure was used as the basic reservoir of knowledge in developing American Industry curriculum materials.

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[2] Nancy Smith Nelson, "The Conceptual Approach to Teaching" (Madison: School of Home Economics, University of Wisconsin, 1964), Unpublished.

[3] Concept is referred to as "a psychological construct resulting from a variety of experiences (detached from the many situations giving rise to it) fixed by a word or symbol, having functional value to the individual in his thinking and behavior." (Face and Flug, 1965, p.10)

[4] Conceptual Structure, Models and Definition of American Industry, 1967. This contains the graphic representations of the basic concepts (Figure 1) and the definitions of each. It also contains the models (Ex. Figure 2) and definitions depicting the sub-concepts for each basic concept.

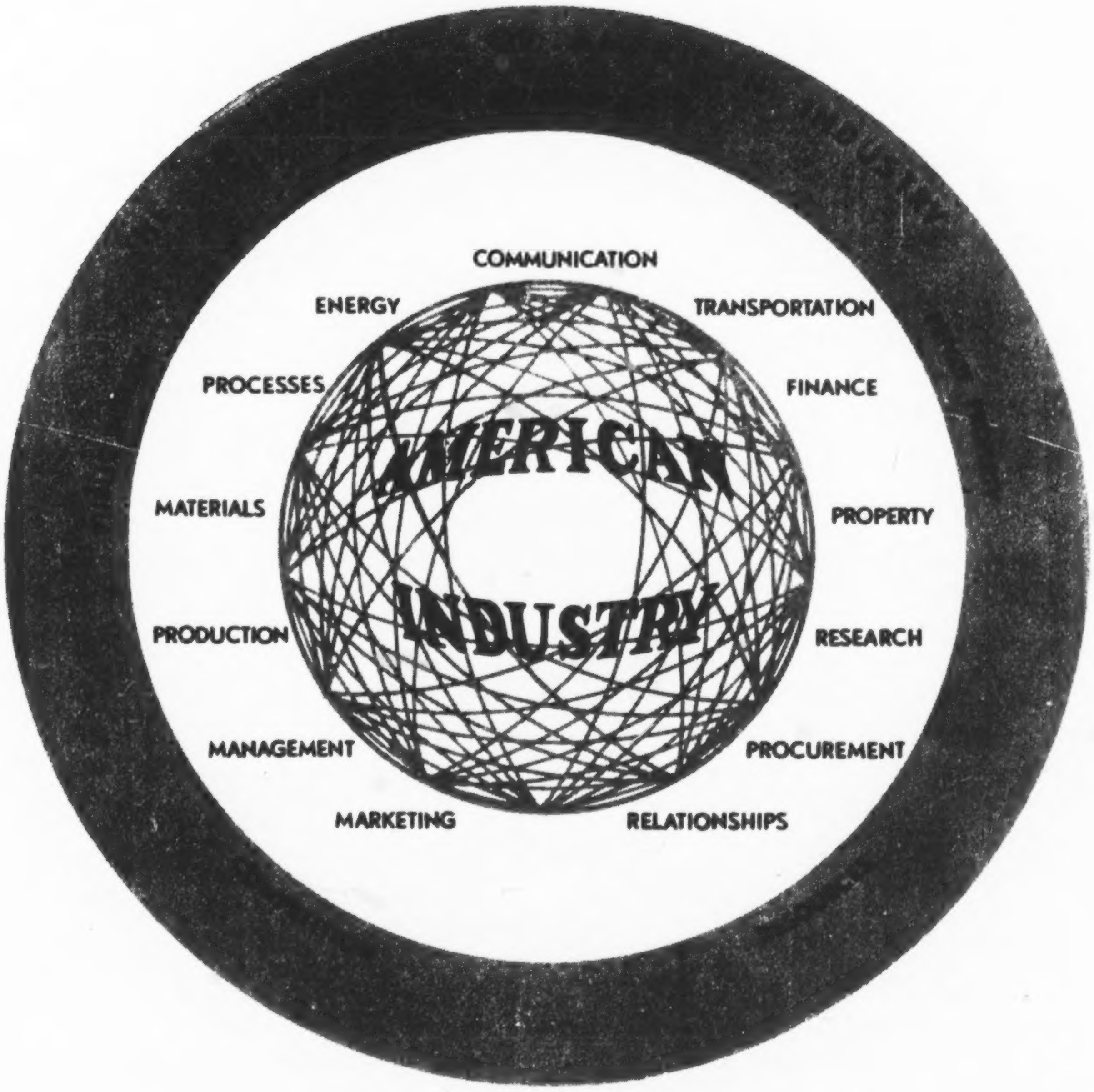
INDUSTRY
COMMUNICATION
ENERGY
TRANSPORTATION
PROCESSES
FINANCE
AMERICAN
MATERIALS
PROPERTY
INDUSTRY
PRODUCTION
RESEARCH
MANAGEMENT
PROCUREMENT
MARKETING
RELATIONSHIPS

Fig. 1 Final American Industry Structure

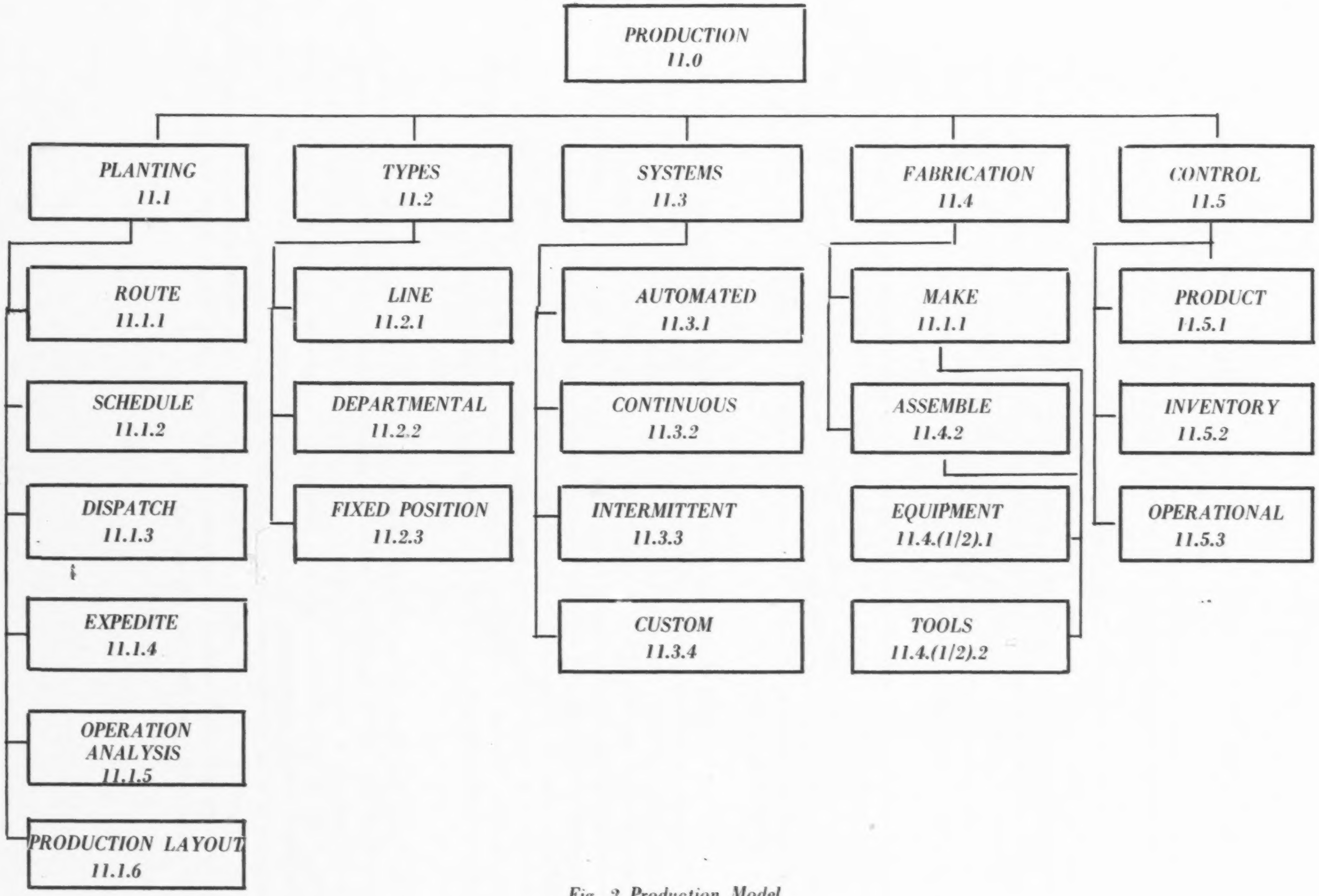
PRODUCTION
11.0
PLANTING
11.1
TYPES
11.2
SYSTEMS
11.3
FABRICATION
11.4
CONTROL
11.5
ROUTE
11.1.1
SCHEDULE
11.1.2
DISPATCH
11.1.3
EXPEDITE
11.1.4
OPERATION ANALYSIS
11.1.5
PRODUCTION LAYOUT
11.1.6
LINE
11.2.1
DEPARTMENTAL
11.2.2
FIXED POSITION
11.2.3
AUTOMATED
11.3.1
CONTINUOUS
11.3.2
INTERMITTENT
11.3.3
CUSTOM
11.3.4
MAKE
11.1.1
ASSEMBLE
11.4.2
EQUIPMENT
11.4.(1/2).1
TOOLS
11.4.(1/2).2
PRODUCT
11.5.1
INVENTORY
11.5.2
OPERATIONAL
11.5.3

Fig. 2 Production Model

Development of Concepts, Models, and Definitions

A first structure was developed by the American Industry Project staff, the Project's participating teachers, and cooperating members of the faculty of Stout State University. The initial structure was viewed as a tool of inquiry, to be reshaped as insights were gained. Several cycles of investigation and refinement resulted in the conceptual framework shown in Figure 1.

Following a review of available literature and some initial consultant contacts, consultant information packets were prepared. These packets were designed to aid in fully developing and validating the concepts, concept definitions, and structure of American industry. They contained an introduction to the American Industry Project, guidelines for the consultants using them, and copies of the structure, models, and definitions previously developed. Over two hundred industrialists, labor leaders, and educators reviewed these packets, each offering suggestions influencing the refinement of the original structure.

A sample of the universities, organizations, and enterprises from which consultants were obtained would reveal representation of such institutions as: University of Minnesota, University of Chicago, University of Wisconsin, California Institute of Technology, United Auto Workers--Milwaukee, Carnation Company, American Federation of Labor--Congress of Industrial Organizations, North American Aviation, American Marketing Association, Oscar Mayer and Company, and Minnesota Mining and Manufacturing Company.

With the definition of American industry as a guide, the American Industry Project staff systematically analyzed the consultant responses and refined the conceptual structure, the concept models and definitions. This team effort by the staff utilized the system represented in Figure 3. Reflecting upon the definition of American industry, major concepts were first reviewed and revised where approrpiate. Then, starting with the definition of a specific concept, the definition was challenged to determine if it appeared to be logical and complete. If the consensus was that the definition was not appropriate, the concept was redefined. If the initial definition was found to be logical and complete, the next step included a review of additional information, at which time samples were collected of instances or examples that represented the concept area. These samples were reviewed to determine if the definition subsumed all instances or examples.

If the definition did not embrace all examples, the appropriateness of excluded examples was challenged. By challenging the anomalous examples it was determined whether to redefine the concept, or, if inappropriate, discard the examples. At this point, it was assumed that a logical and complete definition had been developed. The qualifications of the concept were then challenged. If the concept did not qualify as a major concept, the information was filed for inclusion in other concept areas and development of this concept stopped. However, if the concept did qualify as a major concept of American industry, the examples that were collected earlier were sorted into meaningful categories. Based upon the categories which had been identified, subconcepts were identified and defined.

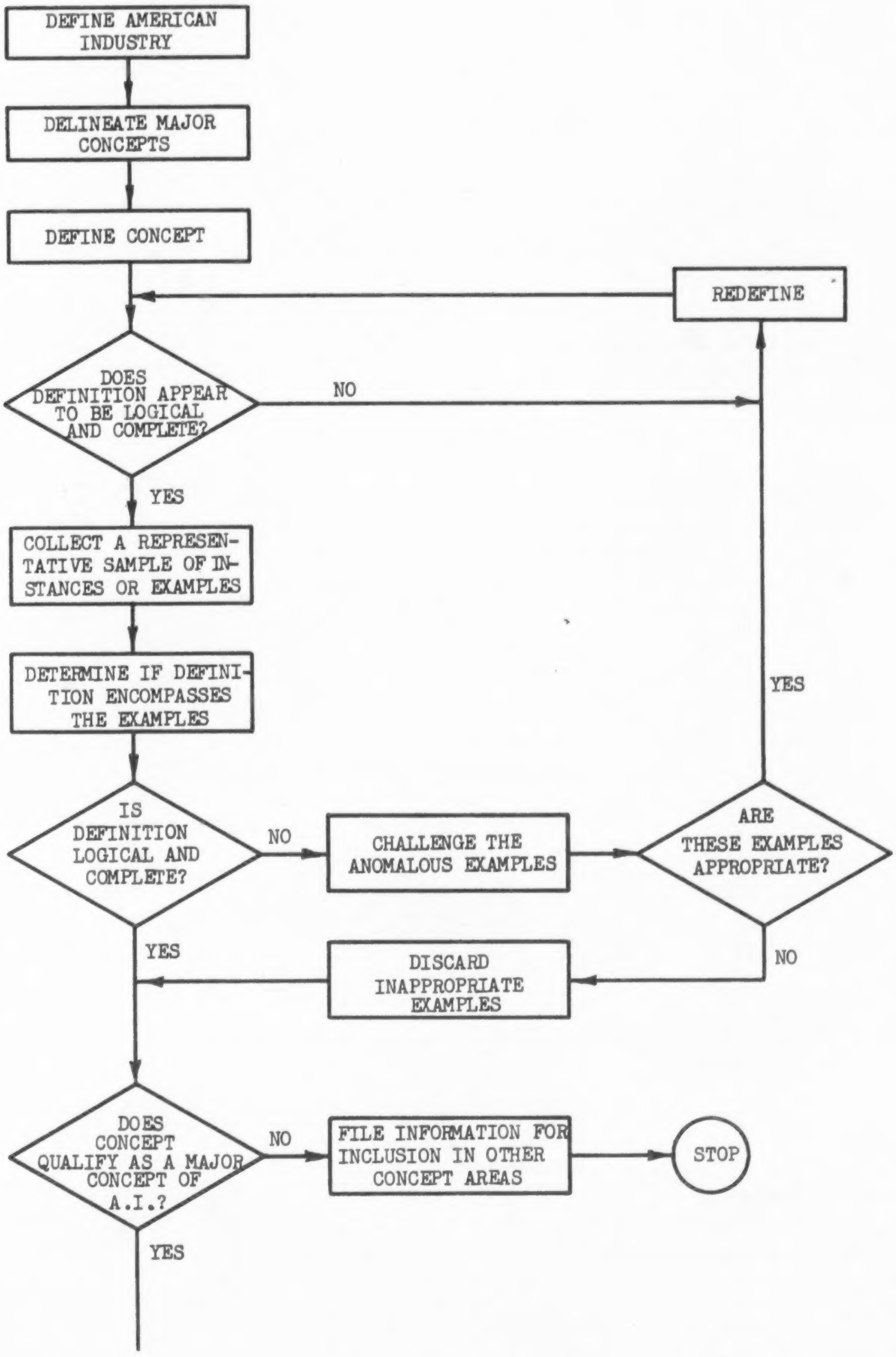
DEFINE AMERICAN INDUSTRY
DELINEATE MAJOR CONCEPTS
DEFINE CONCEPT
REDEFINE
DOES DEFINITION APPEAR TO BE LOGICAL AND COMPLETE?
NO
YES
COLLECT A REPRESENTATIVE SAMPLE OF INSTANCES OR EXAMPLES
DETERMINE IF DEFINITION ENCOMPASSES THE EXAMPLES
YES
IS DEFINITION LOGICAL AND COMPLETE?
NO
CHALLENGE THE ANOMALOUS EXAMPLES
ARE THESE EXAMPLES APPROPRIATE?
YES
NO
DISCARD INAPPROPRIATE EXAMPLES
DOES CONCEPT QUALIFY AS A MAJOR CONCEPT OF A.I.?
NO
FILE INFORMATION FOR INCLUSION IN OTHER CONCEPT AREAS
STOP
YES

Fig. 3 CONCEPT DEVELOPMENT

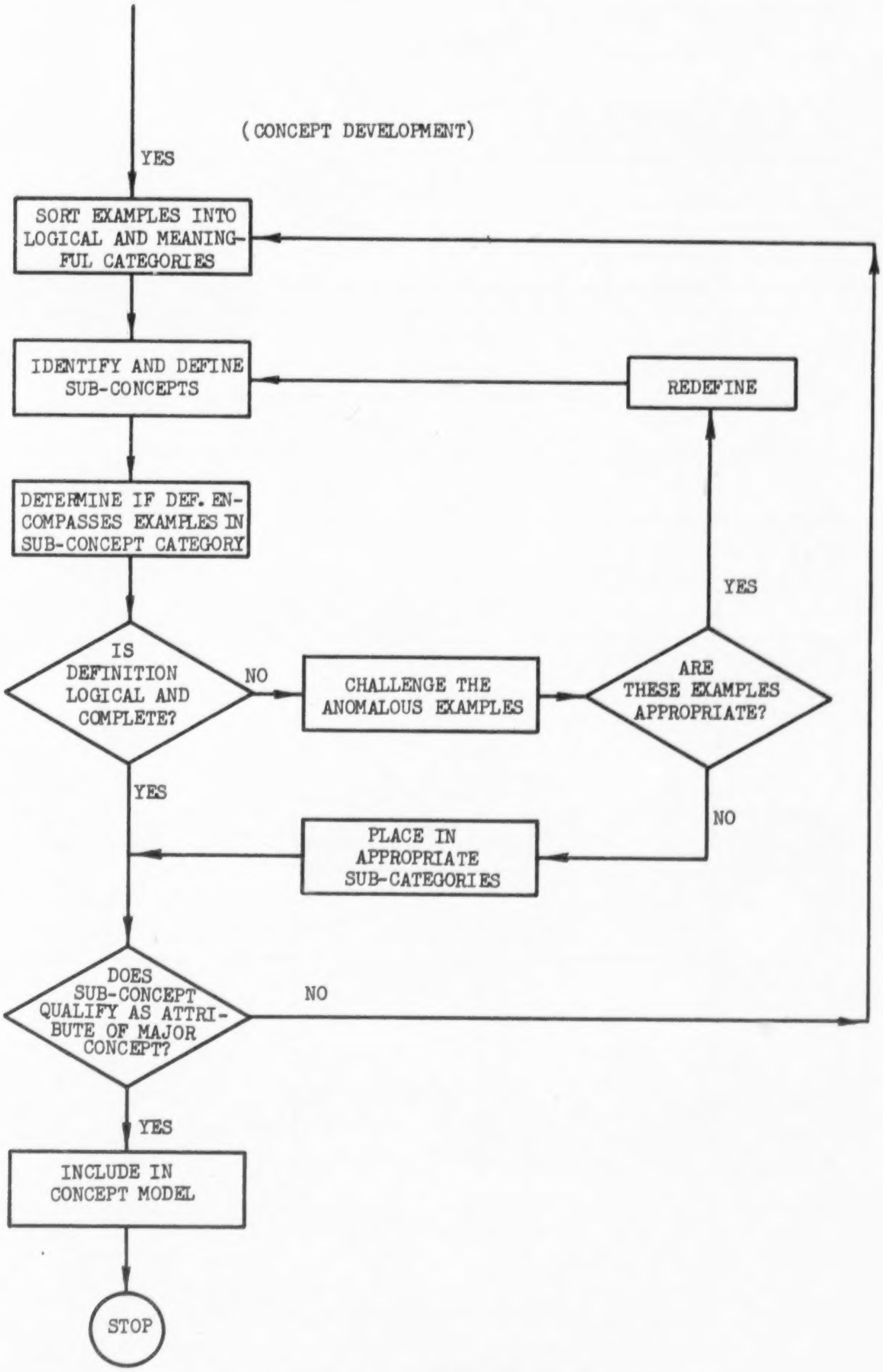
(CONCEPT DEVELOPMENT)
YES
SORT EXAMPLES INTO LOGICAL AND MEANINGFUL CATEGORIES
IDENTIFY AND DEFINE SUB-CONCEPTS
REDEFINE
DETERMINE IF DEF. ENCOMPASSES EXAMPLES IN SUB-CONCEPT CATEGORY
YES
IS DEFINITION LOGICAL AND COMPLETE?
NO
CHALLENGE THE ANOMALOUS EXAMPLES
ARE THESE EXAMPLES APPROPRIATE?
YES
NO
PLACE IN APPROPRIATE SUB-CATEGORIES
DOES SUB-CONCEPT QUALIFY AS ATTRIBUTE OF MAJOR CONCEPT?
NO
YES
INCLUDE IN CONCEPT MODEL
STOP

Fig. 3 CONCEPT DEVELOPMENT
(cont.)

major concept was challenged, the anomalous examples forced a redefinition of the sub-categories. It was then decided whether the sub-concepts qualified as an attribute of the major concept. If it did not, the information was recategorized. If the sub-concept did qualify, it was included in the major concept.

These techniques were used because they provided a method of organizing and analyzing our work. It is realized that other techniques may also fit with the development of conceptual course materials. However, by using the system described, the models and definitions for each conceptual area were logically developed. Figure 1 gives the complete structure and identifies the major concepts that emerged from the study outlined above. The development of the total structure took about two and one half years. At the present time, the School of Applied Science and Technology, here at Stout State University, is continuing to analyze these substantive areas of American industry.

A Taxonomical Breakdown of Level I American Industry

Once the body of knowledge was defined, a taxonomical breakdown of the Level I American Industry course was developed.[5] (See Figure 4) This breakdown was prepared by Orville Nelson and the author in an effort to structure a hierarchy of learning which in turn provided the basis for starting behavioral objectives. Two techniques developed by Gagne' were used. First, his appproach for mapping or structuring instructional content was used as a synthesis technique to obtain the logical sequence of the course. Second, this learning analysis procedure was used to define the elements to include in the course and to identify any hierarchies that existed in these elements.

In developing any course, one of the basic considerations must be the educational objectives expected to be achieved, that is, the changes desired in students as a result of the educative process. For this course the hierarchy of educational objectives was developed in view of the concepts of American industry. Mager's (1962) work served as the guide to writing the objectives in behavioral terms. The sequence of these objectives may be seen by studying the taxonomical breakdown shown in Figure 4 and the course construction procedures described in the following paragraphs.

Note Figure 4. A Taxonomical Breakdown of Level I American Industry, to obtain a graphic picture of the hierarchy of objectives. At the bottom of the page are listed the beginning competencies normally found with eighth grade students. Some basic competencies that can be expected are: eighth grade reading and math skills, normal psychomotor development, experience

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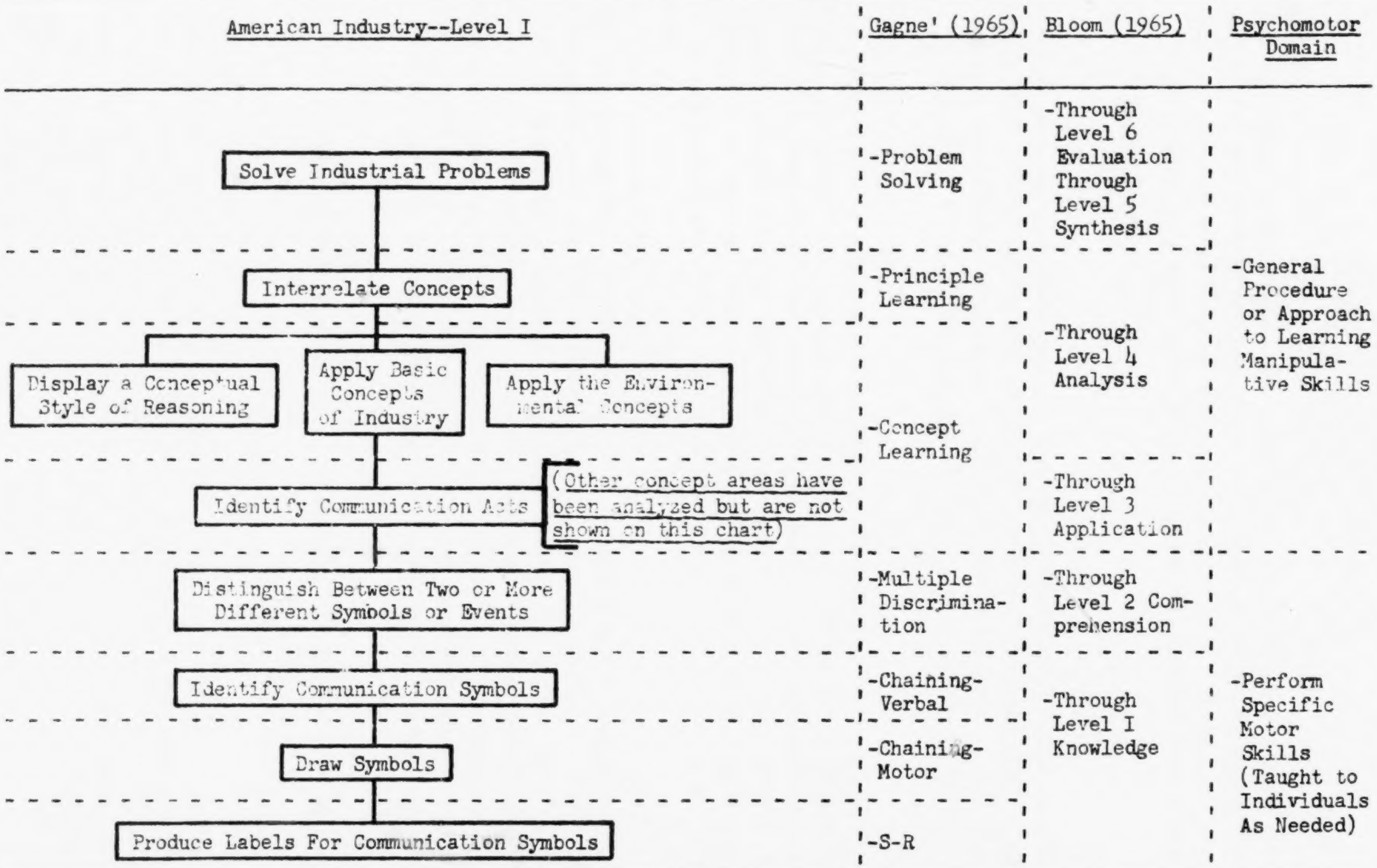
[5] Level refers to a point of change in the course objectives in the American Industry curriculum. There are three levels of American Industry. Level I is the first year, Level II the second year, and Level III the third year. (Objectives for each level appear later in this paper) It should be noted that Levels I and II are being field tested on a semester basis as well as a full year.

6/16/67 A TAXONOMICAL BREAKDOWN OF LEVEL I AMERICAN INDUSTRY

O. Nelson
R. Gebhart


American Industry--Level I
Gagne' (1965)
Bloom (1965)
Psychomotor Domain
Solve Industrial Problems
Interrelate Concepts
Display a Conceptual Style of Reasoning
Apply Basic Concepts of Industry
Apply the Environmental Concepts
Identify Communication Acts
(Other concept areas have been analyzed but are not shown on this chart)
Distinguish Between Two or More Different Symbols or Events
Identify Communication Symbols
Draw Symbols
Produce Labels For Communication Symbols
-Problem Solving
-Principle Learning
-Concept Learning
-Multiple Discrimination
-Chaining-Verbal
-Chaining-Motor
-S-R
-Through Level 6 Evaluation Through Level 5 Synthesis
-Through Level 4 Analysis
-Through Level 3 Application
-Through Level 2 Comprehension
-Through Level I Knowledge
-General Procedure or Approach to Learning Manipulative Skills
-Perform Specific Motor Skills (Taught to Individuals As Needed)

Some Beginning Competencies - Typical 8th Grade Students

1. Reading and Communication Skills
2. Mathematics Skills
3. Normal Psychomotor Development
4. Exposure to Local Enterprises
5. Experience in Handling and Spending Money
6. Etc.

Fig. 4 A TAXONOMICAL BREAKDOWN OF LEVEL I AMERICAN INDUSTRY

in handling and spending money, and exposure to local enterprises. As in nearly any group, individual competencies of students will vary, therefore, the teacher will have to compensate for these variations by using techniques and activities which are appropriate for his students and environment.

This chart uses communication, one basic concept of American industry, as an example to show how the Level I course is taxonomically structured.[6] However, any of the concepts shown in Figure 1 might have been used as the example. The first level of the hierarchical order involves simple recall of information or simple stimulus -response patterns. This could be merely naming specific facts or being able to give the names of various communication symbols without any real understanding of these facts or symbols. An example in the communication area would be simple recall of the senses used in communicating without understanding how the senses were involved in communicating or being able to say the words such as "sign", "person", and "behavior". The second level includes motor and verbal chaining. At his level the student could draw symbols used in communicating. He would also be able to link the names of symbols with the actual symbols. The purpose is to get the events in proper order. Lengths of the chains will vary with individuals.

The next level invloves multiple discrimination. The individual working at this level would be able to distinguish among many events or stimuli in his environment. As an example, the person would be able to distinguish among the various communication symbols or acts. At the next higher level, the student would be able to group events or objects, classify them, and apply some generalizations to them. By responding to events, which he has mentally classified, he is actually applying conceptual reasoning. An example of applying conceptual reasoning would be: after observing many concrete situations which demonstrate the way ideas are conveyed from one person to another the student forms a concept of communication. If the concept is truly formed, the individual could then display a conceptual style of reasoning by applying his concept of communication to many other situations which are unique to him. This would be the test for his conceptualization of communication.

At this level the student could also apply other concepts identified as basic concepts of industry. In this course, for example, he would be able to apply the concept of transportation by demonstrating how the movement of materials or people is planned and carried out. Or, he might apply his concept of research by solving problems through a systematic and unbiased investigation of the problem. It should be noted that at this level the student would not interrelate the concepts being applied.

The next level deals with principle learning. Principles are really chains of concepts, but with the relationships between concepts included. By breaking down concepts we can analyze the elements of each organizational structure and identify elements that form a concept and show the relationships between concepts. An example of principle could be shown in an analysis of communication in industry. Let's assume that our concept of communication is basically, "the conveying of ideas by means of signs and symbols for the purpose of affecting behavior." And, our concept of production is "the generation of goods or services." In analyzing any company we can form some simple principles by linking these concepts.

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[6] Communication is defined as "the act of conveying ideas by means of signs and symbols for the purpose of affecting behavior."

A. In order to produce goods or services a description of the product is needed.

B. Drawings and specifications may be used to describe objects. The principle being that communication is essential in order to produce goods or services.

It is evident that to form principles, concepts must have already been formed. It is also apparent that hierarchical progress through the level of principle forming involves the linking of concepts. Therefore, complexity and sophistication of the principles formed are directly related to conceptual understanding.

Problem solving is at the upper level of the taxonomy. Realizing that an infinite variety of problems exist and that problems are solved at many levels of difficulty, it is still possible to isolate some common characteristics of problem solving. Problem solving involves:

A. Developing a plan of procedure for solving the problem.

B. Exercising judgments in determining what information is required in solving the problem.

C. The arranging of parts or information to form a logical pattern.

D. Discovery of new information.7

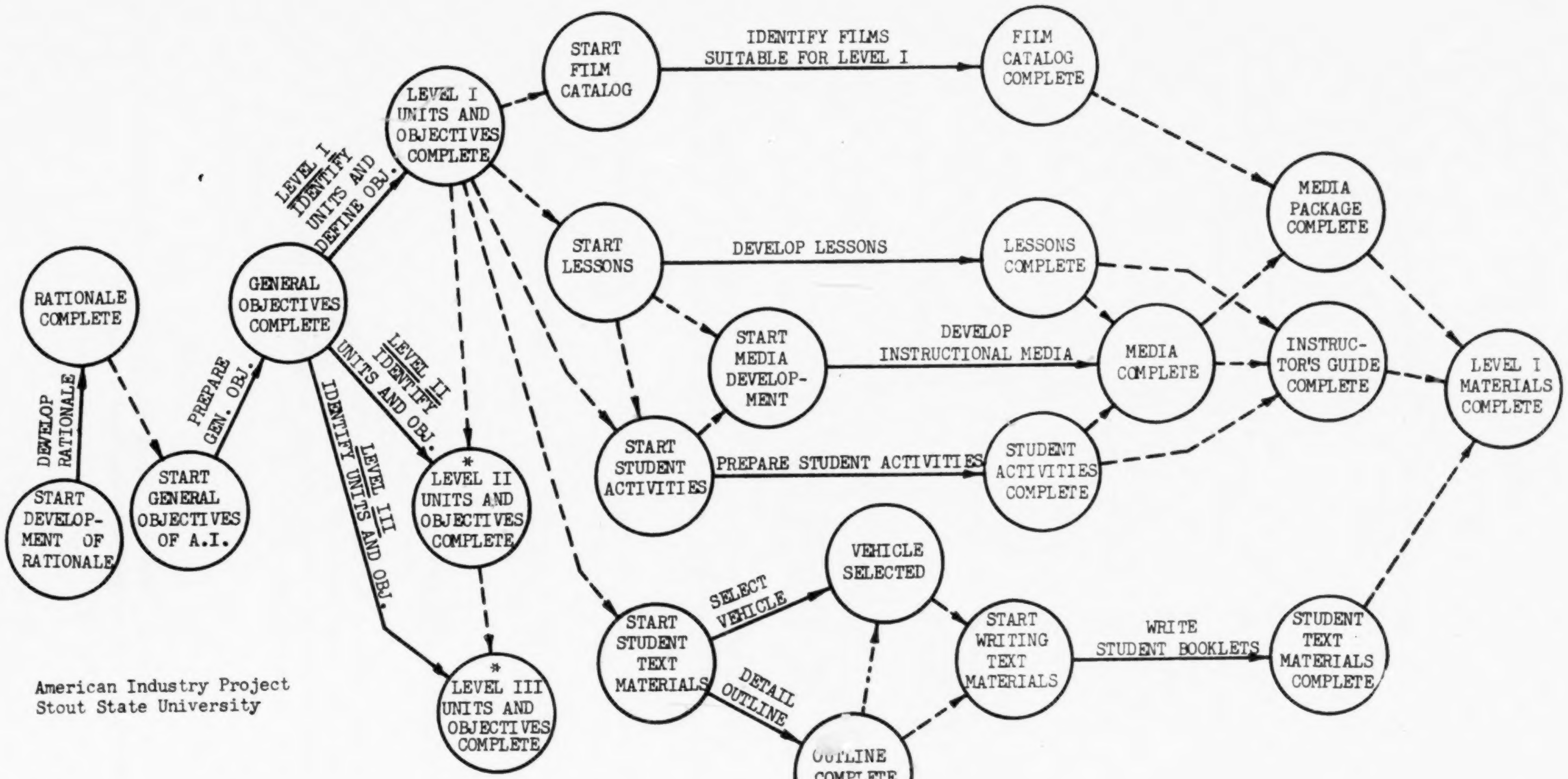
The term "problem" is directly related to the solver. What might be a problem for one person could well be "old hat" for another. In essence, the concepts and principles formed by the learner will be a determiner of the problems he can solve and the level of his answers.

Bloom's Taxonomy of Educational Objectives (Cognitive Domain,1965) also served as a quide in preparing objectives for this course. The taxonomical breakdown by Bloom combined with Gagne's work provided the base for a meaningful classification system for the course objectives.

The psychomotor domain was also considered in developing this course. Specific motor skills are taught during the first three units of the course However, this does not include the development of a specific group of skills for each student, but skills needed by an individual in order to carry out classroom activities. That is, if the student activity consists of mass producing wooden coasters which requires the use of the band saw and disc sander, not all students who need to know (operators and foremen) would be taught these skills.

Some general manipulative skills would be taught, however, the focal point would be the concept of skills learning. It would involve the process of learning a skill, and not necessarily how to operate a particular piece of equipment. The learning would be conceptually oriented in order that the information and process could be transferable to other learning situations. This allows the students to learn a variety of manipulative skills with greater efficiency through the use of a conceptual orientation to skills learning.

The affective domain is reflected in the course materials and student attitudinal changes are brought about in various ways. An example is safety. In the American Industry classes safe use of machines and tools is demonstrated, safety literature is distributed, and safe practices in industry are noted and posted. Some other attitude changes expected are developed in the students' feelings toward profit, competition, government, and industry.


START DEVELOPMENT OF RATIONALE
DEVELOP RATIONALE
RATIONALE COMPLETE
START GENERAL OBJECTIVES OF A.I.
PREPARE GEN. OBJ.
GENERAL OBJECTIVES COMPLETE
LEVEL I IDENTIFY UNITS AND DEFINE OBJ.
LEVEL II IDENTIFY UNITS AND OBJ.
LEVEL III IDENTIFY UNITS AND OBJ.
LEVEL I UNITS AND OBJECTIVES COMPLETE
* LEVEL II UNITS AND OBJECTIVES COMPLETE
* LEVEL III UNITS AND OBJECTIVES COMPLETE
START FILM CATALOG
IDENTIFY FILMS SUITABLE FOR LEVEL I
FILM CATALOG COMPLETE
START LESSONS
DEVELOP LESSONS
LESSONS COMPLETE
START MEDIA DEVELOPMENT
DEVELOP INSTRUCTIONAL MEDIA
MEDIA COMPLETE
START STUDENT ACTIVITIES
PREPARE STUDENT ACTIVITIES
STUDENT ACTIVITIES COMPLETE
START STUDENT TEXT MATERIALS
SELECT VEHICLE
VEHICLE SELECTED
DETAIL OUTLINE
OUTLINE COMPLETE
START WRITING TEXT MATERIALS
WRITE STUDENT BOOKLETS
STUDENT TEXT MATERIALS COMPLETE
MEDIA PACKAGE COMPLETE
INSTRUCTOR'S GUIDE COMPLETE
LEVEL I MATERIALS COMPLETE

American Industry Project
Stout State University

*These Activities Will Not Be Detailed In This Network.

R.G.

Fig. 5. *THE DEVELOPMENT OF LEVEL I CURRICULUM MATERIALS*

Having discussed the method and rationale involved in preparing the educational objectives of this course, an overview of all American Industry curriculum materials is in order.

The Development of Level I Curriculum Materials

With the structured body of knowledge as the basic source of information and the taxonomical breakdown of the course objectives in mind, let's view the development of the Level I curriculum materials. (See Figure 5 - steps in developing the first level materials.

Development started with preparing the rationale for instituting a new curriculum entitled American Industry (Face and Flug, 1965) The rationale contains the fundamental reasons for a new curriculum and the general objectives of the curriculum. The general objective of the American Industry courses were seen as:

A. To develope an understanding of those concepts which directly apple to industry.

B. To develop the ability to solve problems related to industry. All materials for the American Industry courses were developed with these two objectives as a base.

Next, objectives for the three levels of American Industry were identified. They are:

Level I, ,designed for eighth grade students, has the following course objectives:

1. To develope a knowledge and understanding of the major concepts of industry and their relationships.
2. To develop the ability to solve simple problems related to industry.

Level II, designed for tenth grade students, has the following course objectives:

1. To develop in-depth understanding of the concepts of industry, and develop refined understandings of the relationships among the concepts.
2. To expand the ability to recognize and solve complex problems related to industry

Level III, which is for twelfth grade students, id designed to develop knowledges and problem solving skills within a concept area or cluster of concept areas apprpriate to the individual's level of ability and interests.

Next, the course outlines were prepared in accordance with the objectives (general and level) and the conceptural method of presentation.

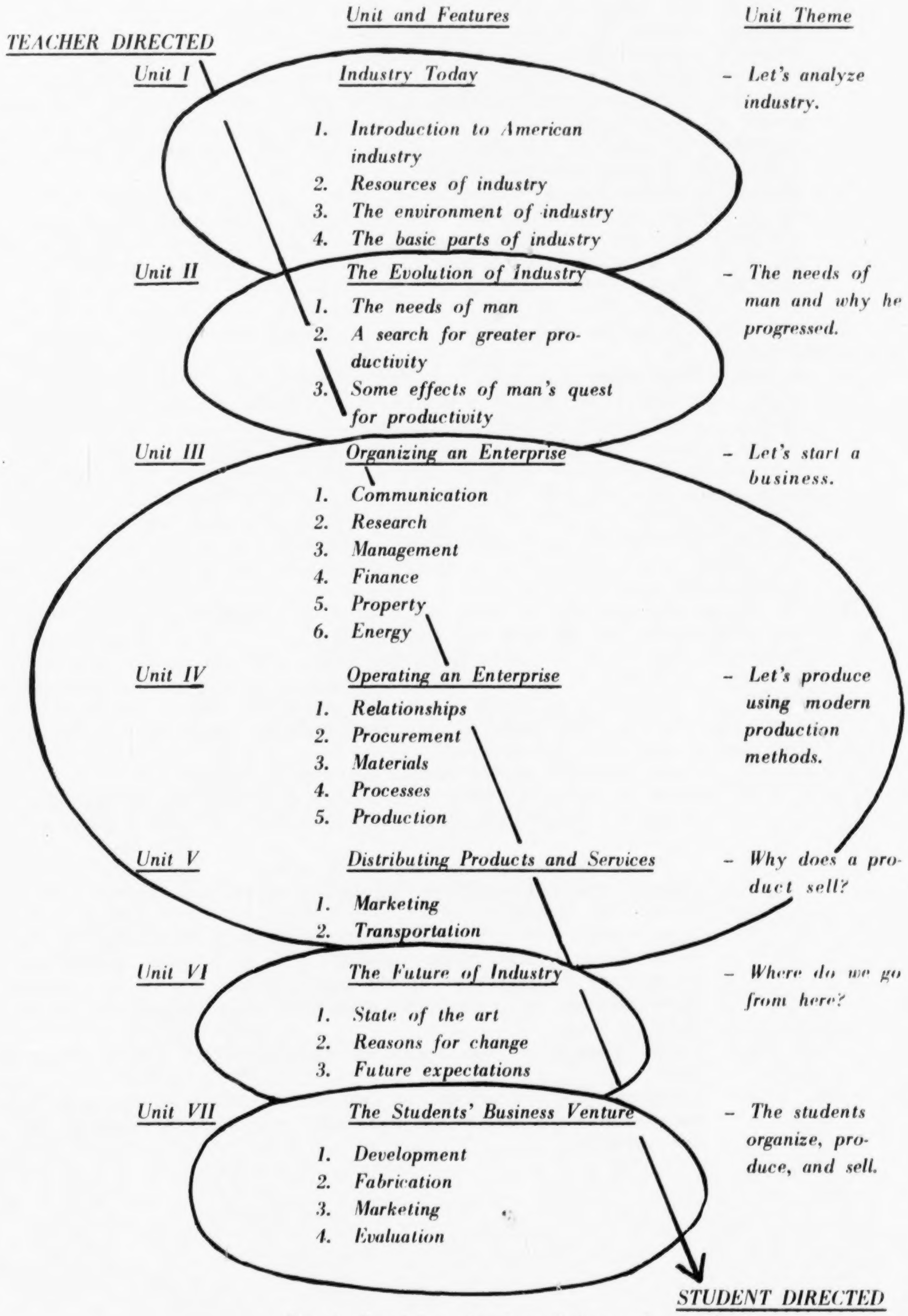
From this point forward, this paper will detail the preparation of Level I materials. Levels II and III are being developed in a similar manner.

Level I, Unit Outline and Objectives

In describing the unit outline for Level I, it should be noted that unit objectives were also identified and later were followed by lesson objectives. Each set of objectives was built upon the basic objectives. The sequence in preparing objectives was as follows:

A. General American Industry objectives
B. Level objectives
C. Unit objectives
D. Lesson objectives

Figure 6, Level I - American Industry Course Outline was prepared with the aid of various structuring methods. The seven units outlined represent:



TEACHER DIRECTED

	Unit and Features	Unit Theme
Unit I	Industry Today 1. Introduction to American industry 2. Resources of industry 3. The environment of industry 4. The basic parts of industry	– Let's analyze industry.
Unit II	The Evolution of Industry 1. The needs of man 2. A search for greater productivity 3. Some effects of man's quest for productivity	– The needs of man and why he progressed.
Unit III	Organizing an Enterprise 1. Communication 2. Research 3. Management 4. Finance 5. Property 6. Energy	– Let's start a business.
Unit IV	Operating an Enterprise 1. Relationships 2. Procurement 3. Materials 4. Processes 5. Production	– Let's produce using modern production methods.
Unit V	Distributing Products and Services 1. Marketing 2. Transportation	– Why does a product sell?
Unit VI	The Future of Industry 1. State of the art 2. Reasons for change 3. Future expectations	– Where do we go from here?
Unit VII	The Students' Business Venture 1. Development 2. Fabrication 3. Marketing 4. Evaluation	– The students organize, produce, and sell.

STUDENT DIRECTED

Fig. 6 Level I – American Industry Course Outline

A. A course that utilizes the cyclical approach and is designed to "cycle" through the basic concepts of American Industry once in Unit I and once in Unit II. Individual concepts are studied in greater detail during Units III, IV, and V. At the completion of these three units the student will have studied each of the concepts and thus will have completed another cycle. Each time a cycle is completed the student progresses to a more sophisticated level of understanding as is represented in Figure 4. At the higher levels the student is problem solving at a level commensurate with his abilities.

B. Another structuring method involves moving from a teacher directed activity to student directed activity. That is, when starting the course most activity is teacher directed, however, as the course progresses activity direction is gradually shifted to the students. This allows for in-depth problem solving which is necessary to reach the higher levels of learning.

After the Level I objectives and outline had been completed the following activities were started:

A. A Level I film catalog was prepared. This catalog contains reviews of 16mm sound films suitable for Level I students. It is designed to assist teachers in locating films that directly relate to the conceptual areas taught in American Industry, therefore, the films are grouped according to concept area. Each film has been previewed and found to be acceptable for the stated level. The title, rental arrangements, cost, company, and a brief synopsis is presented for most films. A total of 141 films is listed in the Level I catalog. (Daehling and Wolf, 1967) It should be noted that, although the films previewed are the best of those located, future plans include development of conceptually oriented films more directly related to the course materials.

B. The lessons were also started when unit outlines and objectives were complete. In developing the lessons the following process was followed. First, themes were introduced as variants of the concepts to be studied. The general unit objectives were then reviewed. Next, the detailed objectives for the lessons were developed. At the same time, however, lesson length was established. When the objectives and outline for the entire unit had been completed, the lessons were written. Each lesson consists of the following:

    1. Theme (variation on the concept or principle involved).
    2. Behavioral objectives which were developed according to the procedure defined in Figure 4, A Taxonomical Breakdown of Level I American Industry.
    3. A general description, or scope, of the lesson.
    4. Resource references identifying instructional media, and literature for students and teacher.
    5. Lesson content which has been written in dialogue form addressed to the instructor. Lesson content consists of an introduction, activity and content, and a conclusion. In the lesson content, the resource reading, lesson activities, and instructional media have been appropriately keyed into that lesson.
    6. Student activities are also a part of these lessons but will be discussed later.
    7. Evaluation items are included in each lesson, however, it has been suggested that the teacher use these only as a guide to preparing his own evaluation.

C. The student activities were designed by the same person who prepared the lesson and became a part of the lesson. In many lessons there are sufficient activities to allow a selection from two or three activities available for that lesson. These activities allow the student to become involved in real industrially related learning situations. Examples of some activities used in Level I include: planning for and mass producing wooden coasters and silk screened pennants, going on field trips to observe natural resources or to visit an enterprise, posing labor-management problems and solving them through arbitration, establishing a small student enterprise, selling stock in the company, doing research on a product, performing market research, planning for continuous production of a product or a service, preparing financial and personnel records, conducting hiring interviews, and writing final reports indicating profit or loss of the company.

This represents a cross section of the activities included in the Level I instructor's guide. Later, there will be a further explanation stating how the entire instructor's guide operates.

D. Project developed media. As each lesson and its activities were completed the media for that lesson was started. A film, overhead transparency packets, slide series, audio tapes, graphs, charts, mobiles, and bulletin board displays have been developed for use in this course. As mentioned before, each has been keyed to a specific lesson to allow the teacher to quickly identify its location in the lesson.

E. Student texts were written for each of the seven units in Level I. Written in a contemporary style, the student texts contain examples of simple industrial events, the principles of which are readily transferable to situations in various companies. Each test contains a table of contents, illustrations, bibliography, and definitions of the salient terms used. Text reading assignments are also keyed to specific lessons in the instructor's guide. The reading level of the student texts has been evaluated. Determination of the reading level was done by Mrs. Sylvia Nelson, a person with a background in reading research. In establishing the reading level Mrs. Nelson used the Dale-Chall (1948) formula.

General Operating Characteristics of the Course

The following provides an overview of the methods of operation employed in course development. Details of the procedures are found in the "American Industry Procedures Book" (1967).

Using the Instructor's Guide and Student Texts

Before attempting to teach American Industry courses, an understanding of the philosophy and rationale is necessary. It is also necessary to know how the instructor's guide is used and how to safely demonstrate equipment used in the laboratory.

As mentioned before, the guide is divided into units and lessons. In each unit, the first lesson provides the introduction. Successive lessons develop the concepts of American industry through the cyclical method. In each cycle, the aim is toward deeper understanding of the concepts. In Units III, IV, and V the basic concepts are the first studied individually, and then the relationship between the concept being studied and those previously studied are discussed.

In using the guide and student texts, the teacher should start by perusing the introduction and course outline. Next, the units, corresponding student activities, and student text materials should be studied. At this point the teacher should have evolved an overview of the course about to be taught. He should then read the student text materials and mentally interweave the lessons and student activities with the student texts.

When the teacher has accomplished the above, he should study each unit, lesson by lesson, and detail his course in preparation for teaching it. This should include the identification of selected activities and approximate lesson dates.

As in any new course, it is necessary to determine the effectiveness of the course material. For the American Industry Project a system was designed to gather feedback information from teachers and students using the course materials. Many of the revisions came as a result of student and teacher feedback forms. In addition, classroom observation, teacher interviews, and student contacts provided feedback data.

Feedback and Revision of Curriculum Materials

As mentioned, improvement of these materials has been accomplished through many means. Observation in the classrooms and laboratories, followed by interviews with participating teachers and students has provided much data. The Project's supervisor of participating teachers visited each school monthly. During his visits to participating centers he recorded information pertaining to the instructional technique being used, instructional media employed, and the students reaction to the presentation or activity. The visitation record prepared by the supervisor of participating teachers is discussed with the participating teacher following each observation. Additional suggestions for improving curriculum materials are often made during these discussions.

Another feedback tool is the lesson feedback form. One feedback form is completed by the teacher at the end of each lesson. It contains an overall rating of the lesson, an appraisal of the objectives, content, instructional media, plus other general comments. A similar form is prepared as an overall rating of each unit.

A media feedback form is completed each time instructional media are used by the participating teacher. This form also provides data necessary for media revision.

The student reading material is rated by the students and the teacher. Each student is encouraged to make comments within the booklets and underline words he doesn't understand. Students are also asked to note any lack of continuity they feel exists. Finally, the students complete a formal rating of each booklet, the Nelson Rating Scale for Written Materials. This form is designed to gather a sequence of information related to the students' attitude toward the booklets, vocabulary, the style and layout of each booklet, readability of the booklets, and content.

Teachers also examine each booklet and note spelling, punctuation, and technical errors. In addition, they check literary continuity and suggest addition or deletion of material.

All feedback information is recorded and filed by unit and lesson to be used for revision purposes. In making revisions each comment is reviewed and analyzed before making the change.

Evaluation of Curriculum Materials

In order to determine the effects and operating characteristics of the American Industry courses, evaluation procedures have been developed and employed. A wide spectrum of evaluation procedures was designed to obtain descriptive and comparative data. Details of the evaluation may be found in a paper by Orville W. Nelson (1967). The paper is available from the American Industry Project.

Conclusion

The previous pages have described the procedures, rationale, and philosophy which are fundamental to the American Industry Project. A logical structuring of conceptual models, combined with taxonomically arranged objectives provide a hierarchical learning pattern for students of American Industry.

The instructor's guide serves as the focal point for all course materials. That is, it provides guidance for the teacher in identifying a consistent course pattern; it identifies supplemental reading for teacher and student; it provides suggested student activities, it combines suitable media with prescribed lessons; and it outlines evaluation items. By combining the instructor's guide, student texts, and instructional media one can envision an instructional package designed for teaching the concepts of American Industry.

REFERENCES

American Industry Project Staff. Conceptual structure, models and definitions of american industry. American Industry Project, Stout State University, Menomonie, Wisconsin, February, 1967.

Bloom, B. S. *Taxonomy of educational objectives -- handbook I cognitive domain.* New York: David McKay Company, Inc., 1956.

Daehling, W. and R. Wolf. Suggested films for teaching first level american industry. American Industry Project, Stout State University, Menomonie, Wisconsin, 1967.

Dale, E. and Jeanne S. Chall. A formula for predicting readability: instructions. *Educational Resource Bulletin*, 1948.

Face, W. L. and E. R. F. Flug. The establishment of american industry as a transitional subject between general and vocational education. American Industry Proposal to USOE, Stout State University, Menomonie, Wisconsin, 1965.

Face, W. L. E. R. F. Flug, W. Daehling, R. Gebhart, O. Nelson, H. Olstad, and J. Zuerlein. American Industry Procedures Book, American Industry Project, Stout State University, Menomonie, Wisconsin, July, 1967.

Gagne', R. N. The conditions of learning. New York: Holt, Rinehart and Winston, Inc. 1965.

Mager, R. F. Preparing instructional objectives. Palo Alto, California: Fearon Publishers, 1962.

Nelson, Nancy Smith, The conceptual approach to teaching. School of Home Economics, University of Wisconsin, Madison, Wisconsin, 1964.

Nelson, O. W. The american industry project: development and evaluation, prepared for curriculum programs in action: their administration and evaluation. American Industry Project, Stout State University, Menomonie, Wisconsin, February, 1967.

Appendix E

Modern Curriculums Demand New Media and Methodology

by

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May, 1969

American Industry Project
USOE Contract No. OE-5-85-060
Co-Directors:
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"Modern Curriculums Demand New Median and Methodology" these words formulated the direction and philosophy in the development of instructional media for the American Industry Curriculum. Unlike many present industrial arts curriculums, American Industry does, in fact, require new and modern media which, in turn, must provide for new methodology in utilization as well as in student and teacher response.

An attempt was made to make the media "come alive" and to demand the integration of curriculum materials, concepts, and knowledges. In order to do this, all media were directly correlated with the lessons and their objectives. They were designed to stimulate discussion rather than merely support lectures and present facts which would be regurgitated later by the sometimes familiar student memorization robot.

The "plan of attack", so to speak, followed, with some modification, a twelve point developmental procedure established by Dr. David P. Barnard, Director of Stout State University's Audio Visual Center. These twelve points are as follows:

1. Delimit the subject matter area.
2. Identify behavioral objectives.
3. Identify the curriculum structure.
4. Identify the course content.
5. Plan the program budget.
6. Select the curriculum specialist.
7. Form a curriculum specialist media specialist relationship.
8. Plan the media.
9. Produce the media.
10. Check the media
11. Utilize the media effectively in teaching.
12. Evaluate the media

It is quite evident that this directive was most conducive to a team approach. Such an approach was adopted, and the media development began.

It would be advantageous, here, to trace the development of the media to see just how it was correlated within the curriculum.

Delimiting the Subject Matter Area

The subject matter for the American Industry curriculum, initially established by Dr. Wesley Face and Dr. Eugene Flug, and later by Richard Gebhart was the foundation upon which all materials were to be developed. The decision to study "those concepts directly related to industry" opened the doors for the development of supporting mediative presentations and materials. It also supplied the directive for various other curriculum materials for which media were to lend support.

Identifying the Behavioral Objectives

The two overriding behavioral objectives established by the Project were:

1. To develop an understanding of those concepts which directly apply to industry.

2. To develop the ability to solve problems directly related to industry.

Specific unit and lesson objectives were developed later. All of these objectives, then, became the overriding objectives of the media.

An attempt to reach an understanding of "those concepts which directly apply to industry" through mediative presentations was evident in the media content, which demanded discussion. Understanding through discussion, then, was to lead to the solution of problems. Many of these problems were included in the content of the media.

Identifying the Curriculum Structure

From the preliminary framework evolved the present American Industry structure. Figure 1 shows this structure.

Identifying the Course Content

The structure provided a guide to the development of the curriculum materials, which were to include an instructor's guide, student booklets, and instructional media. The content was derived from the knowledges of industry related to the structure shown in Figure 1.

Plan the Program Budget

Budgetary items involved with media development fell under the headings of:

1. Laboratory equipment

2. Production supplies

3. Staff

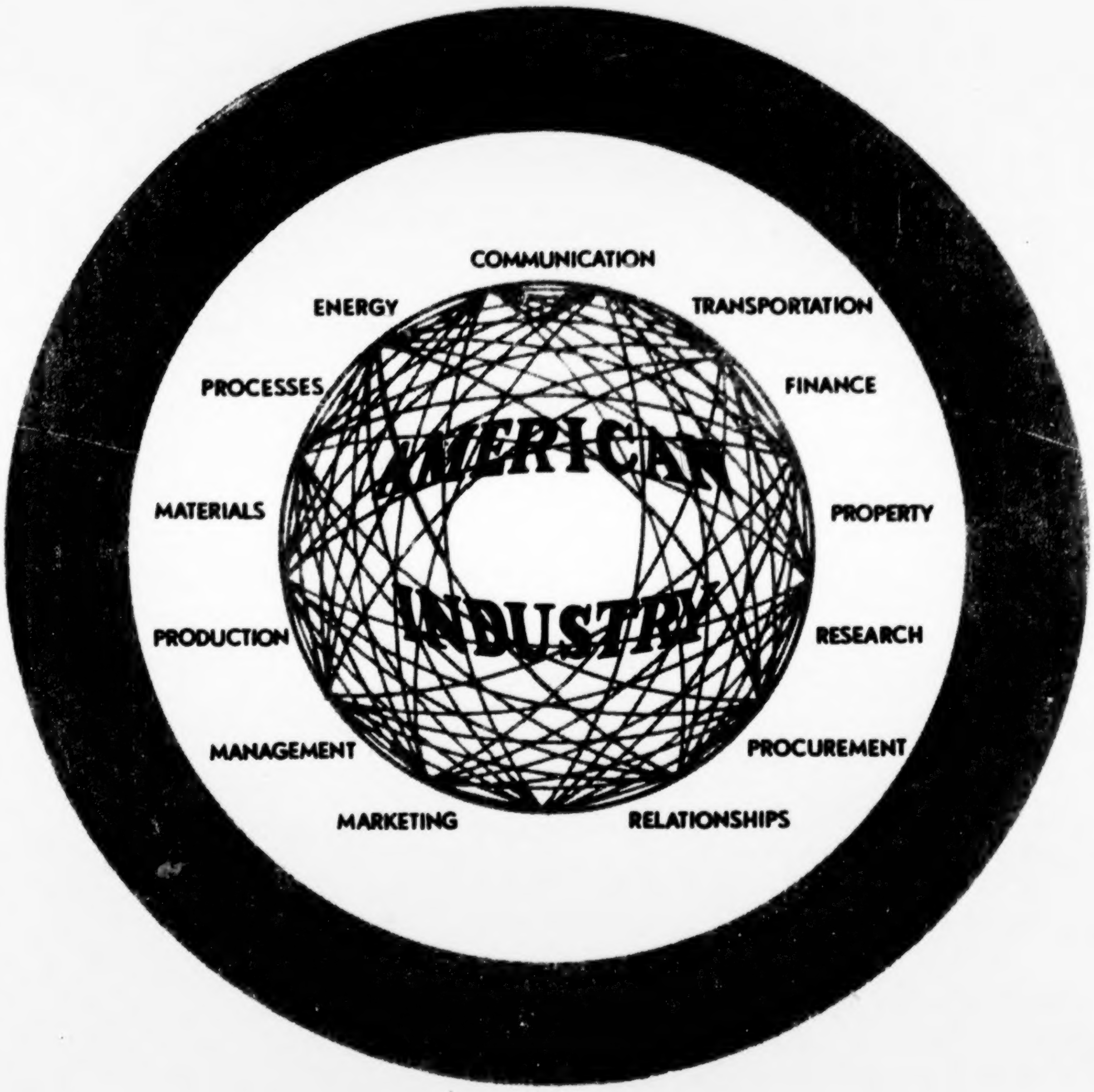
COMMUNICATION
ENERGY
TRANSPORTATION
PROCESSES
FINANCE
AMERICAN
MATERIALS
PROPERTY
INDUSTRY
PRODUCTION
RESEARCH
MANAGEMENT
PROCUREMENT
MARKETING
RELATIONSHIPS

Fig. 1. FINAL AMERICAN INDUSTRY STRUCTURE

Laboratory equipment included such items as light tables, audio-visual projection equipment, drawing and graphics equipment, etc. The production supplies took the form of papers, acetates, paints, and various other expendable items. As for staff, one full time staff member designated as "Instructional Media Specialist" was named. One graduate assistant and one work study student were also assigned to this area.

Select the Curriculum Specialist

A curriculum specialist was designated to write the curriculum materials for American Industry. Several participating teachers were also selected to field test the total program.

Form the Curriculum Specialist, Media Specialist Relationship

Figure 2 shows the relationship between the Curriculum Specialist and the Media Specialist. It was the task of the Curriculum Specialist to develop the specific lesson objectives and to draft a preliminary lesson plan. Once this was completed, the lesson and objectives were given to the Media Specialist for an analysis of possible media that could enhance the lesson and assist in reaching the objectives.

The type of media, if any, was to be selected. This was the task of the Media Specialist. Since the various types of media (filmstrips, slides, overheads, instructional films, etc.) lend themselves to certain situations more effectively than others, a decision of which to use was necessary. Also, participating teachers had more overhead projectors available than slide projectors. Thus, overhead transparencies were selected more frequently than slides as the media.

Once this decision was made, the content of the media was determined. This was generally dictated by the lesson content and objectives. Here, the Media Specialist and Curriculum Specialist worked closely together to insure the proper presentation of information so as to most effectively reach the established objectives.

With the content stabilized, the media was written into the lesson. Here again, the media and curriculum specialists jointly decided on the methods of presenting the media within the lesson plan.

At this point, the actual media was to be developed. The process for developing the media follows:

Plan the Media

The first step was to review the lesson plan. Realizing that excellent and efficient instruction is necessary in meeting the objectives, planning of the media and mediative presentations was of utmost importance.

Information pertaining to the media was placed on "Instructional Media Job Sheets". Figure 3 is an example of a job sheet. This sheet listed all information necessary for planning

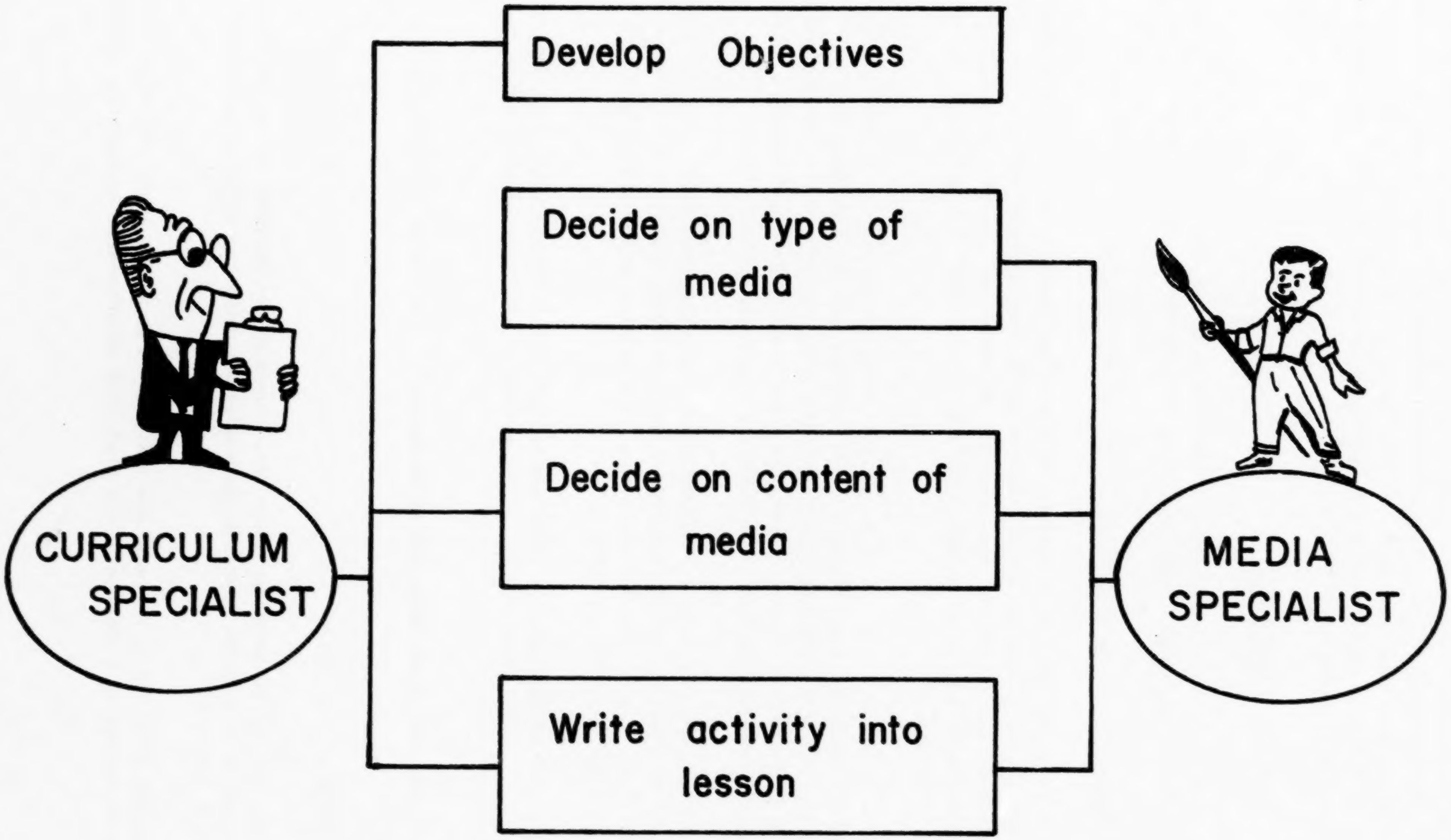
Develop Objectives
Decide on type of media
Decide on content of media
Write activity into lesson
CURRICULUM SPECIALIST
MEDIA SPECIALIST

Fig. 2. CURRICULUM SPECIALIST – MEDIA SPECIALIST RELATIONSHIP

Date ______________________________ *Job No.* ______________

Completion Date ______________________

Level No. ___________________________

Unit No. ___________________________

Lesson No. __________________________

Activity No. _________________________

Tentative Title ________________________

Objective to be met:

Suggested Design:

Medium:

(Attach to this sheet the content outline and complete activity sheet.)

Fig. 3. INSTRUCTIONAL MEDIA JOB SHEET

PRODUCTION TITLE ____________________ SHEET NO. ____

DATE ________ JOB NO. ____

MEDIUM—16MM ☐ **TV** ☐ **FILM STRIP** ☐ **2 x 2 TV SLIDES** ☐ **2 x 2 SLIDES** ☐

COLORS WANTED ON CELLS ____________________

FRAME NO. ________

NARRATION

FRAME NO. ________

Fig. 4 AV PLANNING SHEET

the media and included any suggestions for design and medium (overhead, slides, etc.). Preliminary sketches were made. These preliminary sketches included graphs, diagrams, illustrations, and lettering. Preliminary narrations were written for filmstrips and slide series.

Audio Visual Planning Sheets were used for preliminary planning of the filmstrips and slide series. An example is shown in Figure 4. The AV Planning Sheet has space for both narrations and sketches.

Student interest was another major concern in the planning stages of the media. Four major items were considered in designing the media to hold student interest. Color was one aspect, and lots of it. Color was prevalent in all slide series and filmstrips. An array of analogous, complementary, triad, and monochromatic effects were selected for the various frames.

Since color was pre-determined when using diazo film, illustrations had to hold the interest. Single line drawings and cartoon characters supplied needed interest factors for overhead transparencies, while illustrations in the slide series and filmstrip often took abstract forms. Examples of each may be seen in Figure 5.

Narrations were of prime importance and presented some unique problems. Quite often, as in the use of some slide series and all overhead transparencies, the instructor had to be the narrator. Scripts were supplied for all slide series. Activity and presentation-discussion guides were written into the lesson plans of the instructor's guide for use of the overhead transparencies.

The narration for the filmstrip "The Future of Industry" was recorded on audio tape, and synchronized with music, music being the fourth interest factor.

All four interest factors were not present in every visual. However, at least one, and quite often two, of these factors was present in each and every complete visual.

Produce the Media

Overhead Transparencies

A total of 57 overhead transparencies were designed and produced for the first level curriculum materials. After preliminary sketches were made, finished artwork was produced on tracing vellum. A combination of india ink, rub on letters and figures made up the overhead masters. Transparencies for all 13 concept areas were designed and included in the instructors media packet. The Diazo process was used in the production of the actual transparencies.

In addition to curriculum materials, staff presentation overheads were produced. These overhead transparencies were utilized in various small group presentations, convention presentations, and educational institution presentations. All transparencies were developed in the American Industry Media Lab. Additional facilities which were not available from the American Industry Media Lab were supplied by the Stout Audio Visual Center.

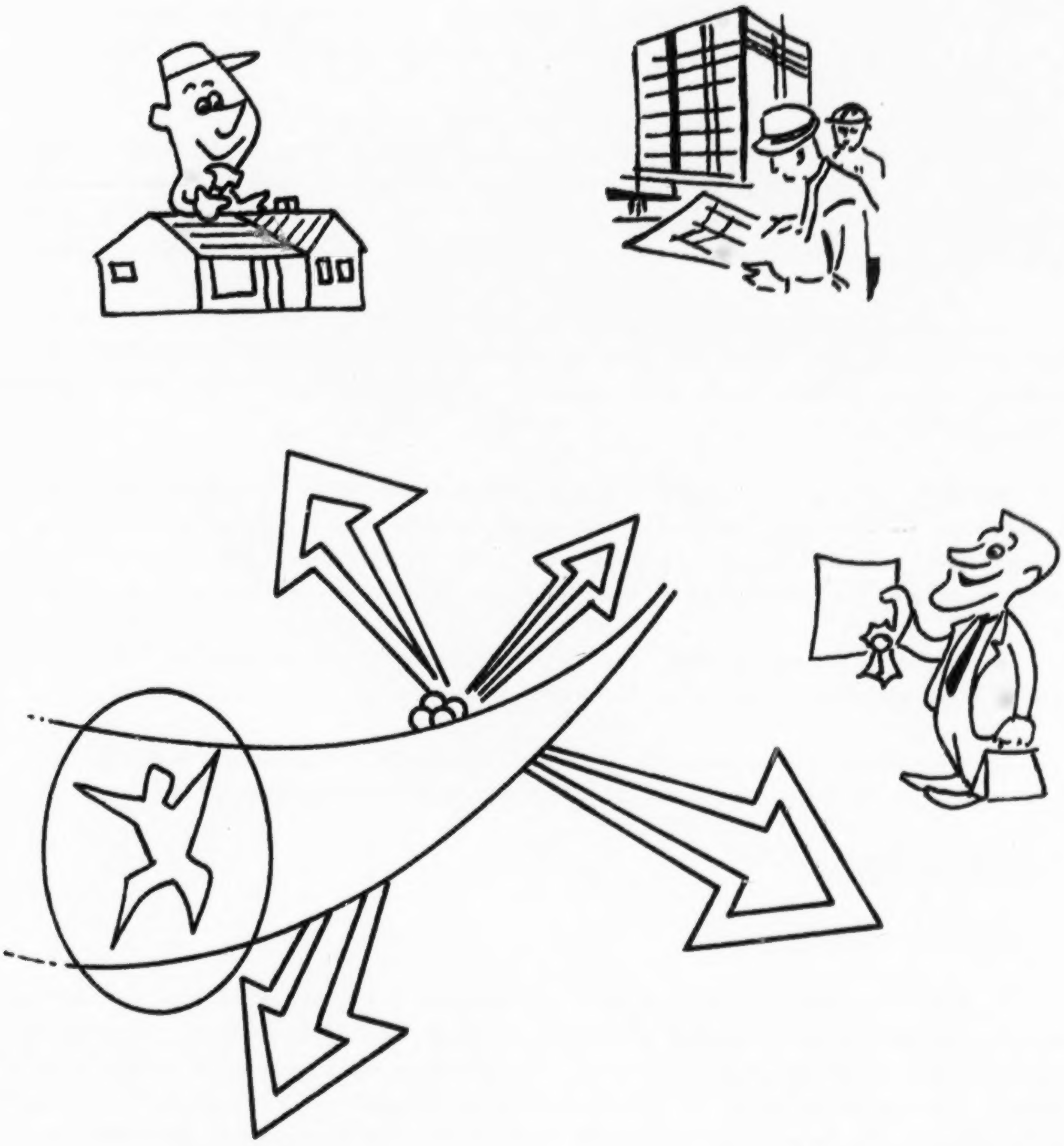

Fig. 5 SAMPLE ILLUSTRATIONS UTILIZED IN THE AMERICAN INDUSTRY INSTRUCTIONAL MEDIA

Slides and Slide Series

A total of five slide series were developed for the first level curriculum. A brief description of each follows:

1. "What Does the Government Do For You." This series contains eighteen slides. It discusses the various governmental regulations placed upon our U.S. economy for public protection. Items covered in the series include our judicial system, interest rates, communication controls, weather forecasting, insecticide specifications, food and drug adminstrations, transportation, pollution, and personal benefits. This series is furnished with a written narration.

   Evaluation (covered later) has indicated that this series did not meet the course objectives. It was from the curriculum materials.

2. "A Capitalistic Economy". Forty-five frames comprise this series which also contains a written narration. The illustrations took the form of cartoon characters. The series deals with the development of capitalism and its status in the American economy. A brief history of its development is included.

   The aspects of private property, free enterprise, individual freedom, incentives, and profit are discussed as the basic features of the American capitalistic economy.

   Again, evaluation dictated the removal of this slide series.

3. "Man to Machine." "Man to Machine", a slide series containing 31 slides, traces the development of machinery in the textiles, farming, drafting, and construction industries. Some of the earlier machines are introduced as well as those presently being used in these industries. This series is illustrated by actual photographs and drawings and does not utilize abstract symbolism.

4. "An Introduction to Production". The last slide series utilized in Level I American Industry is entitled "An Introduction to Production ". It contains a total of 62 slides and is designed to help the student better understand production as it relates to industry. Various aspects of production, such as scheduling, job assignments, quality control, processes, industrial relations, facilities, materials and materials handling, and planning are visualized and discussed within this series. Photographs of actual industtial processes, charts, graphs, and plant layouts are included in the illustrations.

5. "Advertising is an Invitation". The latest slide series to be introduced to the curriculum is entitled "Advertising is an Invitation." This series contains 70 frames. It is a self-contained teaching unit that may be viewed individually or in a group. The narration is included on each frame. A built in test is also included.

The various aspects of advertising media and their appeals are discussed. Several examples of each are included. The built in test covers each phase of the series by asking the student to identify appeals, select effective advertising media for various products, relate advertising to the communication process, and to design an actual ad. This series has not yet been evaluated or utilized in the classroom. Its release is pending approval of several corporations whose products and trademarks are displayed within the series.

Several hundred slides were also developed for staff presentations. These slides were cataloged and placed in a reference file for staff members to check in and out.

Film Strip: "The Future of Industry". One flimstrip containing 36 frames was designed for Level I American Industry. Two facilities were used in the production of this filmstrip: The American Industry media lab, and commercial photographic facilities. All artwork and narration were complete in the American Industry and Stout Audio Visual Laboratories. The process used for illustrations (which took very abstract form) was as follows:

1. A detailed working drawing was completed in pencil, within a specified format.
2. Prepared acetate was placed over the drawing and the illustration was then traced onto the acetate in India ink.
3. Cartoon paint was then applied to the reverse side of the acetate. By doing this, the sharp outlines (made in ink) could be maintained. The colors, which dry in a matte finish, were given added brilliance when viewed through the acetate.
4. All backgrounds were given a soft smooth appearance by utilizing various airbrush patterns on poster board.

The narration and background music were taped in the Stout Audio Visual Sound Lab and synchronized onto one audio tape. All artwork was then set to a commercial photographer for photographing, packaging and labeling.

The purpose of this filmstrip is to present a number of possible ideas that may become a reality in the future and how theyn might affect our society. It is designed to meet the following objectives:

At the conclusion of this lesson the student should be able to:

1. Reflect upon the accomplishments of man and logically predict some of man's future accomplishments.
2. Indicate areas of industry that are expected to expand through the development of new products.

16 MM Films. One 16mm film entitled "American Industry" was produced by the Stout Audio Visual Center, in close cooperation and consultation with the American Industry Project staff. This film is 19 minutes long with sound and color. Its purpose is to provide the viewers with a basic conceptual understanding of American Industry. Students will become familiar with the elements of industry, the typical sequence of industrial activities, and the similarities among industires. In addition, the film tells how industry affects the student. The film stresses these six points:

1. American Industry affects everyone in our society; and, therefore, we should have an understanding of it.

2. Industries are similar in many ways and the basic similarities are identified as: (a) products are needed, planned, produced, and sold to attain a profit and (b) in order to produce products industry needs men, machines, and materials.

3. A combination of men and the extension of his capabilities, machines, are related to output efficiency.

4. Communication plays a major role in industry; whether it be between man and man or man and machine.

5. Testing and quality control insure the production of a product that meets desired standards.

6. Company sales rely upon the ability to persuade people that their product best meets the customer's needs.

Film Catalogs. Three film catalogs and two supplements were developed for classroom use. All films were previewed to determine the grade level at which each film should be viewed. This was determined by the level of understanding typical of each grade.

Over 5,000 films were previewed, evaluated, and catagorized according to concept area. Each film catalog lists films alphabetically in each of nineteen areas: Introductory Unit, Communication, Transportation, Finance, Property, Research, Procurement, Relationships, Marketing, Management, Production, Materials, Processes, Energy, Resources, Competition, Public Interest, Culminating Unit, and History of Industry. Each catalog is also designed to assist the instructor in finding films that directly relate to the areas taught in the American Industry Curriculum.

One catalog and a supplement for use in Level I, an additional catalog and supplement for Level II; and one catalog for Level III were developed.

Overhead Transparency Masters. A set of overhead transparency masters have been produced. These were printed on mimeo bond paper and were intended for use in a thermofax or 3M copier. Each booklet contains masters for all overhead transparencies used in the Level I American Industry course. They have been arranged by a numbering system, coded for assembly and filing purposes. Figure 6 shows the numbering system. These booklets contain a complete description of the code and assembly instructions for each type of overlay, plus additional tips on adding color and giving visual presentations.

__Printed Materials.__ The Instructional Media Laboratory and staff assumed the responsibility of duplicating most of the printed publications concerning the American Industry Project. Of the many and varied materials reproduced, the seemingly most significant are listed below:

1. Level I, II & III Instructor's Guides.

2. Descriptive pamphlets for mailing packets (13 different pamphlets).

3. Overhead Transparency Masters Booklets.

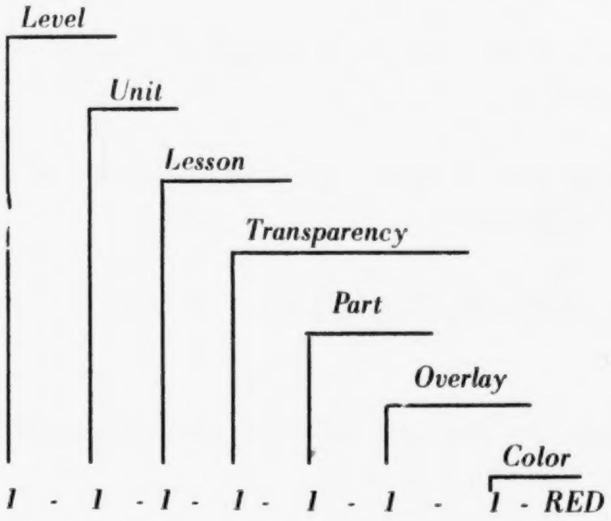

Fig. 6. NUMBERING SYSTEM FOR OVERHEAD TRANSPARENCIES

4. Evaluation Materials

5. Evaluation and Informative Reports

6. Two newsletters.

In addition to the above mentioned, various letters, announcements, covers, program descriptions, proposals, feedback information, and post cards were reproduced. An estimated 20,000 reams, or 10,000,000 sheets of paper have been processed through the Gestetner reproduction machine.

Check the Media

All materials must be checked. Instructional media is no exception. Nothing is more distracting than a misspelled word; a backwards slide; an unpleasant color scheme; or false information.

As soon as the media was complete, it was previewed and checked against the objectives. All necessary changes, if any, were made at this time.

Utilize the Media Effectively in Teaching

All media must be utilized in order to determine its effectiveness. The American Industry media was introduced to the participating teachers at area workshops. It was the purpose here to instruct the instructors on the intent and use of all media. Various approaches to use and to time of use were presented at these workshops. Follow-up activities were also suggested.

With this background, then, the teachers were ready to utilize the media in actual teaching situations. Each instructor was issued one complete set of media. The availability of media was deemed necessary. Far too many good instructional devices have been overlooked due to inaccessibility. This was not the trend in the American Industry Curriculum. The problems, if any, were in terms of inaccessibility of projection equipment rather than media.

Evaluate the Media

Evaluation of the media was conducted by various feedback sheets which were filled out by the instructors. Figure 7 indicates the response totals from instructional media information sheets. By studying the responses in Table 1, an overall picture of the effectiveness of the media in each unit can be obtained. Problems can also be detected, such as the inaccessibility of projection equipment. The large numbers in the "no response" column towards the latter units can be attributed to the fact that many instructors were behind schedule in planning and neglected to return the information.

By and large, the overhead trasnparencies were used by all instructors. They were reported to be in excellent physical condition and most instructors had access to an overhead projector. The overall effectiveness was rated high except for Unit I. Feedback indicated the needed information to enable these transparencies to be revised.

All slide series and filmstrips were reported to be in excellent physical condition. The accessibility to remote controlled projectors was almost nill; however, most schools had some type of projection equipment available.

The slide series "What Does the Government Do For You" and "Capitalistic Economy" which appear in Unit I received much criticism and only average rating in terms of effectiveness in reaching objectives. After due consideration, it was decided to drop these series from the list of media and to delete them from the Curriculum Materials. The remaining slides and filmstrip received high ratings, with particular praise for the filmstrip "The Future of Industry."

Lesson and unit feedback and questionnaires to participating teachers also supplied evaluation of the media. Table 2 shows these questions and responses along with several interesting facts, those being:

TABLE I

Instructional Media Information Responses

SECTION I - Overhead Trasnparencies

1. Indicate your usage of the overhead transparencies furnished for this unit.

Unit I	13 ALL	1 SOME	0 NONE	3 NO RESPONSE
Unit I	13	1	0	3
Unit II	None available at time of evaluation			
Unit III	9	1	0	7
Unit IV	9	2	0	6
Unit V	6	1	0	9
Unit VI	None available at time of evaluation			
Unit VII	2	0	2	13

2. Indicate the physical condition of the transparencies.

	EXCELLENT	GOOD	FAIR	POOR	NO RESPONSE
Unit I	13	1	0	0	3
Unit II	None available at time of evaluation				
Unit III	10	0	0	0	7
Unit IV	10	0	0	0	6
Unit V	7	0	0	0	10
Unit VI	None available at time of evaluation				
Unit VII	2	0	0	0	15

TABLE I continued

3. *Indicate your accessibility to an overhead projector.*

	ALWAYS Available	SOMETIMES Not Available	DIFFICULT To Obtain When Needed	IMPOSSIBLE To Obtain	NO Response
Unit I	10	3	0	0	4
Unit II	None available at time of evaluation				
Unit III	8	1	0	0	8
Unit IV	10	0	0	0	6
Unit V	6	0	0	0	11
Unit VI	None available at time of evaluation				
Unit VII	11	0	0	0	15

4. *Indicate the overall degree of effectiveness you feel the transparencies had in achieving the lesson objectives.*

	VERY HIGH	HIGH	AVERAGE	BELOW AVERAGE	VERY LOW	NO RESPONSE
Unit I	2	3	6	0	0	5
Unit II	None available at time of evaluation					
Unit III	2	6	1	0	0	8
Unit IV	3	7	1	0	0	6
Unit V	3	4	0	0	0	10
Unit VI	None available at time of evaluation					
Unit VII	1	1	0	0	0	15

TABLE I Continued

SECTION II - Slide Series and/or Filmstrips

1. *Indicate the physical condition of the slides and/or filmstrips used.*

	EXCELLENT	GOOD	FAIR	POOR	NO RESPONSE
Unit I	13	1	0	0	3
Unit II	8	1	0	0	8
Unit III	None available at time of evaluation				
Unit IV	3	0	0	0	14
Unit V	None available at time of evaluation				
Unit VI	7	0	0	0	10
Unit VII	None available at time of evaluation				

2. *Indicate your accessibility to a remote controlled, school owned, 2 x 2 slide projector.*

	ALWAYS Available	SOMETIMES Not Available	DIFFICULT To Obtain	IMPOSSIBLE To Obtain	School Does NOT OWN ONE	NO. RESP.
Unit I	1	2	1	2	8	3
Unit II	4	1	1	0	3	8
Unit III	None available at time of evaluation					
Unit IV	2	0	0	0	1	14
Unit V	None available at time of evaluation					
Unit VI	3	0	1	0	3	10
Unit VII	None available at time of evaluation					

TABLE 1 Continued

3. *Indicate your accessiblity to a combination 2 x 2 slide projector - filmstrip projector.*

	ALWAYS Available	*SOMETIMES Not Available*	*DIFFICULT To Obtain*	*IMPOSSIBLE To Obtain*	*School Does NOT OWN ONE*	*NO RESP.*
Unit I	*8*	*4*	*1*	*0*	*0*	*4*
Unit II	*8*	*1*	*0*	*0*	*0*	*8*
Unit III	*None available at time of evaluation*					
Unit IV	*3*	*0*	*0*	*0*	*0*	*14*
Unit V	*None available at time of evaluation*					
Unit VI	*5*	*2*	*0*	*0*	*0*	*10*
Unit VII	*None available at time of evaluation*					

4. *Indicate the overall degree of effectiveness you feel the slide series and/or filmstrips had in achieving the lesson objectives.*

	VERY HIGH	*HIGH*	*AVERAGE*	*BELOW AVERAGE*	*VERY LOW*	*NO. RESP.*
Unit I	*2*	*3*	*7*	*1*	*0*	*7*
Unit II	*1*	*6*	*2*	*0*	*0*	*8*
Unit III	*None available at time of evaluation*					
Unit IV	*1*	*1*	*1*	*0*	*0*	*14*
Unit V	*None available at time of evaluation*					
Unit VI	*3*	*3*	*1*	*0*	*0*	*10*
Unit VII	*None available at time of evaluation*					

1. **One half of the teachers went on field trips where recommended.**

2. **The overhead transparencies did an adequate job with a minimal narration by the teacher. This could indicate student involvement in discussions.**

3. **The instructional media was motivational.**

4. **The immediate availability of the media provided sufficient instructional resources when they were needed.**

5. **The professor-media specialist relationship worked effectively in correlating the media with the lessons.**

6. **The teachers felt the media was an important part of the curriculum materials.**

7. **Overhead transparencies, slide series, and the filmstrip were all effective with no indication of one being more so. This, again, indicated effective planning and design of the media.**

TABLE 2

Responses to Questions Pertaining to Instructional Media

		SD	D	U	A	SA	NR
1.	*We went on field trips to see enterprises.*	*7*	*3*	*0*	*6*	*4*	*1*
2.	*Effective use of overhead requires too much narration by me.*	*11*	*4*	*4*	*1*	*0*	*1*
3.	*Use of the overhead transparencies retains the students attention better than straight lecture.*	*0*	*0*	*3*	*5*	*12*	*1*
4.	*I have more instructional resources to use in my industrial arts classes.*	*6*	*8*	*5*	*0*	*1*	*1*
5.	*The instructional media was effectively correlated with the lessons.*	*2*	*0*	*3*	*13*	*2*	*1*
6.	*The instructional media are not an important part of the materials supplied by the American Industry Project.*	*13*	*4*	*1*	*1*	*1*	*1*
7.	*Overhead transparencies were more effective than the slide series and film series.*	*0*	*7*	*10*	*3*	*0*	*1*

SUMMARY

A brief summary of the preceeding materials would indicate the gradual and systematic development of creative and involving instructional media. To become creative and involving, each design; each format; each medium and each intent was closely scrutinized, tested and evaluated by the Media Specialist, the Curriculum Specialist, and the all important teacher.

Evaluation caused changes . Revisions were frequent. The end product then is a complete set of unique and challenging instructional media to include slide series, overhead transparencies, a film strip, a 16mm film and three film catalogs.

Looking Ahead

The American Industry Curriculum will grow in knowledges, techniques, approaches, and status. With this advancement the necessity of supporting mediative devices will increase.

It is quite evident that all media formats will become involved. Slides, overheads, filmstrips, video tapes, single concept films, audio tapes, and instructional films will be as vital to the American Industry Curriculum as they are to any educational program.

What for the future, then? The American Industry Project has, in fact, been an innovator. The creative approaches to the media development were centered around the use of the media. Design, in terms of commercial art techniques, were more or less standard.

The future direction, then, should be one of developing more effective and challenging methods of student utilization of the media. The student must become involved. Further, it is not intended that the students merely view the media and respond to it. This has already proved to be somewhat effective and still has its place in any program. The phrase "student involvement" implies much more; at least in this instance. Student involvement in planning, production, and evaluation is necessary.

How then, could this be implemented? A few ideas are listed here.

1. Would it be possible to have film footage of various subjects available so that the students could make their own films to suit their needs?
2. A slide file could be made available to students for utilization in student reports and presentations. (It is done in industry, why not in American Industry).
3. Simple kits for making overhead transparency masters and/or transparencies could be made available to students for developing supporting materials for their presentations.
4. Single concept films could be developed by the American Industry classes.

5. Why not have the student public relations department make a PR slide series or film on the student industry and use it in their advertising campaign.

Here are just five possibilities. The intent is quite evident. If instructional media does increase knowledge retention (as it has proved to do so) then student involvement could possibly boost retention to higher percentages.

APPENDIX F

LESSON ANALYSIS AND FEEDBACK SYSTEM: DESCRIPTION AND ANALYSIS OF DATA

by

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Lesson Analysis and Feedback System:

Description and Analysis of Data

Introduction

The design of instructional materials requires a myriad of decisions. Often these decisions have to be made on the basis of insufficient information. It is likley, therefore, that some of the original judgments will be imperfect.[1] In a continuing developmental program this fact is not as troublesome or unnerving as it would be in the instance where there is no provision for revision. During each revision phase, prior decisions can be evaluated and modified.

Since the American Industry Project was funded for a four year period, there was an opportunity to evaluate, revise, and evaluate the revisions. In some instances, this cycle was repeated three or four times for a specific set of materials. Specific procedures were established to assure that the information gathering process was systematic, reliable, and valid.

All of the information gathering techniques and analyses presented in this paper are based on the work of the curriculum specialist. Richard Gebhart (1968) has done an effective job of presenting the methods used to develop the secondary school courses. Thus, only a partial summary of these procedures will be included here. In brief, the task of constructing the secondary school courses centered on translating the American Industry structure of the knowledges of industry into instructional materials that would establish the concepts of industry, interrelationships among these concepts, and the ability to solve industrial problems in the students exposed to these materials.

Gebhart's paper describes in some detail the techniques used for the first level American Industry course. And, this paper will deal primarily with information generated from the feedback on this course.

As mentioned above, the basis for the instructional materials was the Project's structure of the knowledges of industry. Using this structure as the framework, knowledges and understandings related to the concepts and interrelationships were defined. A plan was then developed to place these in a logical and effective sequence in the learning materials. After the materials were developed, two types of information were obtained on their structure and quality. A lesson analysis procedure was designed to determine if the lessons and units in the instructor's guide were developed as planned. In addition, the participating teachers were requested to complete feedback forms on the instructional materials. The next section describes the lesson analysis procedures and exhibits a sample of the information produced. The lesson feedback system and a summary of the data are presented in later sections of this paper.

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[1] This is not meant to imply that these decisions should not have been made. Actually, they may have been the best at the time they had to be made and absolutely necessary for progress in constructing the materials. Rather, I am suggesting that decisions provide the foci for data gathering and evaluation in the development process.

Lesson Analysis

The instructor's guide was designed to help the teacher develop a concept, show its role in industry, and relate it to the concepts previously discussed. Also, the lessons were written to provide for more sophisticated problem solving as the course progressed. Information, activities, and problems were selected and placed in the guide to achieve this design.

Several writers worked on the lessons during the 1967 summer session and part of the ensuing school year. On occasion other duties interrupted the continuity of this work. In addition, there were eighteen concepts and the attributes of the Project's definition of industry to account for in the eighty-four lessons in the guide. Obviously, there was a need for some means to check the product against the original plans and specifications.

An analysis procedure was developed that would provide data on the content and structure of each lesson. The analysis form consisted of a matrix with the concepts and attributes appearing on the horizontal axis and the major portions of the lesson on the vertical axis. These major segments on the vertical axis of the lesson analysis form coincide with the lesson format in the guide and are in order: introduction, body, summary, and lesson activity. Within each of these categories there are sub-divisions to indicate the high and low taxonomy levels and the number of instances at each level. In the introduction and body sections, there are spaces to record the level of the problems and activities included in the materials. The second section of the form provides a means to record the interrelationships made between concepts. The numbers recorded in the cells formed in the matrix represent the six levels in the Taxonomy for the Cognitive Domain (Bloom, 1956). A sample of the Lesson Analysis Form is reproduced in Appendix F-A. Numerical labels for the concepts and attributes are listed in Table 2.

In general, the analysis was completed in the following manner. The reviewer analyzed the lesson and recorded the low and high taxonomy level observed in each portion of the lesson and the level of the problems and activities. The number of instances[2] at each level was also determined. After this information had been recorded, the relationships made between concepts were listed in the second part of the analysis form. An analysis form was completed for each lesson in the guide.

After the analysis had been completed on the guide, the information was placed on tab cards. A card was punched for each line in the analysis form. The last seven columns on each card contained numbers that identified the level of the course, the unit, the lesson, and the card sequence within the lesson. Thus these cards could be sorted and assembled in any manner deemed necessary by the researcher and still be identified as to the lesson, unit, and level to which they pertained.

A printout of the cards sequenced by lesson gives an outline of the content of the lessons. Table 1 gives an example of the output for the first lesson on communication. Sorting on a

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[2] An "instance" is a unitary bit of instruction that can stand by itself. A specific example, problem, or description is an "instance."

TABLE I

Lesson Analysis Output

Fig. 4

```
                                                                                          Unit   Lesson Number
                                                                                    Level        Card Sequence
LESSON ANALYSIS FOR.       LEVEL 1      UNIT 3            LESSON 1          DATE12/13/67  1301001
THEME.   INTRODUCTION  TO  COMMUNICATION                                                  1301002
TIME.  010 PERIOD                                                                         1301003
                     CONCEPTS.       BALL           RING        ATTRIBUTES                1301004
PORTION.             1 2 4 5 6 7 8 9 10 11 12 13 14 20 21 22 23 24 40 41 42 43 44 45 50 51 60 70 1301005
INTRO LO TAX LEV     1 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0 1301006
INTRO HI TAX LEV     0 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301007
INTRO NO AT LO       1 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0 1301008
INTRO NO AT HI       0 0 0 0 0 0 0 0  0     0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301009
INTRO ACTIVITY       0 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301010
INTRO IND PROB       0 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301011
                                                                                          1301012
BODY LO TAX LEV      1 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0  0  0 1301013
BODY HI TAX LEV      2 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301014
BODY NO AT LO        3 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0  0  0 1301015
BODY NO AT HI        3 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301016
BODY ACTIVITY        0 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301017
BODY IND PROB        0 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301018
                                                                                          1301019
SUMMARY LO TAX       1 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301020
SUMMARY HI TAX       3 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301021
SUM NO AT LOW        1 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301022
SUM NO AT HI         2 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301023
LESSON ACTIVITY      0 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301024
INTERRELATIONSHIPS MATRIX.                                                                1301025
                     CONCEPTS.       BALL           RING        ATTRIBUTES                1301026
CONCEPTS ATTRIB      1 2 4 5 6 7 8 9 10 11 12 13 14 20 21 22 23 24 40 41 42 43 44 45 50 51 60 70 1301027
01 LOW TAX LEVEL     0 0 0 0 0 0 0 0  0  0  0. 0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0 1301028
01 HI TAX LEVEL      0 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301029
01 NO AT LOW TAX     0 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  2  0  0  0  0  0  0  0  0  0 1301030
01 NO AT HI TAX      0 0 0 0 0 0 0 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301031
```

TABLE 2
Numerical Labels for the American Industry Structure and Definition

A. *Ball Concepts*

Numerical Label	*Concept*
1	***Communication***
2	***Transportation***
4	***Finance***
5	***Property***
6	***Research***
7	***Procurement***
8	***Relationships***
9	***Marketing***
10	***Management***
11	***Production***
12	***Materials***
13	***Processes***
14	***Energy***

B. *Ring Concepts*

Numerical Label	*Concept*
20	*Government*
21	*Private Property*
22	*Resources*
23	*Competition*
24	*Public Interest*

C. *Attributes of the definition of industry:*

Numerical Label	*Concept*
40	*Institution in our society (also indicates the entire definition of industry)*
41	*Applies knowledge*
42	*Utilizes resources (human and natural)*
43	*Produces good and services*
44	*Meets needs of man*
45	*For monetary profit*

D. Other basic terms used:

Numerical Label	*Concept*
50	*Attributes, characteristics, or similarities*
51	*Concept, conceptual*
60	*Productivity*
70	*Student booklets and / or reading materials*

Sorting on a given concept or attribute produces a listing of all of the lessons in which that item appears. For example, the listing for the communications concept identified forty-two lessons in which material related to this concept is presented.

Table 3 gives some excerpts from this printout. Part I contains the non-zero items under communication from the output presented in Table 1. That is to say, it contains the information on the content related to communication presented in the first lesson of Unit 3. Lesson and Unit numbers are contained in the last seven numbers at the extreme right hand side of the print out. Reading from right to left, the first three numbers represent the card sequence within lessons. The next two digits indicate the lesson number. In this example, it is 01 or lesson number 1. The next number, sixth digit from the right, lists the unit number. In this case, it is 3 or unit number 3. The last digit in the sequence gives the level of the course.

Part II presents the information on the fourth lesson in Unit III. A brief review of the numbers in the first column to the right of the verbal descriptors discloses that the introduction presented factual information related to communication. The body of the lesson started at this level also and moved to the application of this material. Application was also involved in the activity used in this portion of the lesson. In the summary, factual information was reviewed and the student's comprehension was checked.

Part III is the interrelationships matrix from lesson four in Unit V. This information can be discerned in the numbers given in the last seven columns. The large card sequence numbers listed in the last three columns place these cards in the interrelationships matrix. The lesson and unit numbers given to the left of the sequence numbers further identify the source of these data. A look at the numbers given in the first column to the right of the verbal labels reveals that communication is related to marketing in this lesson. (Marketing is identifed by the 09 to the left of the verbal descriptors.) Moreover, communication is discussed through the synthesis level and correlated with marketing. If the reader were to review the actual lesson, he would find that the students were asked to apply their concept of communication to the development of an advertising program.

Comparing the data in parts I, II, and III in Table 3 discloses that the lessons on communication require higher levels of thinking as they progress in the guide. Note that only the first three levels are specified in lessons one and four in Unit III while lesson four in Unit 5 includes the synthesis level.

Another brief look at the remainder of the matrix presented in Part III of Table 3 reveals that other concepts and attributes were also related to marketing. Finance (No. 4), Research (No. 6), Materials (No. 12), goods and services (No. 43), needs of man (No. 44), and the student booklet (No. 70) were assoicated with the marketing concept.

Use of this analysis technique has allowed the research specialist to check the structure and sequence of the instructional materials developed for the teachers. The flexible manner in which the data cards can be sorted provides ready access to the information required in evaluating and revising the instructor's guide. A computer program could be written to perform these sorts and produce a more readable output; however, since the present output can be rather easily interpret-

TABLE 3

Lesson Analysis Output: Selected Output for the Communication Concept

```
PORTION.            1  2  4  5  6  7  8  9 10 11 12 13 14 20 21 22 23 24 40 41 42 43 44 45 50 51 60 70 1301005
INTRO LO TAX LEV    1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0 1301006
INTRO NO AT LO      1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0 1301008
BODY LO TAX LEV     1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0  0  0 1301013
BODY HI TAX LEV     2  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301014
BODY NO AT LO       3  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0  0  0 1301015
BODY NO AT HI       3  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301016
SUMMARY LO TAX      1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301020
SUMMARY HI TAX      3  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301021
SUM NO AT LO        1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301022
SUM NO AT HI        2  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1301023
PORTION.            1  2  4  5  6  7  8  9 10 11 12 13 14 20 21 22 23 24 40 41 42 43 44 45 50 51 60 70 1304005
INTRO LO TAX LEV    1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0 1304006
INTRO NO AT LO      1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0 1304008
BODY LO TAX LEV     1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1304013
BODY HI TAX LEV     3  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1304014
BODY NO AT LO       2  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1304015
BODY NO AT HI       1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1304016
BODY ACTIVITY       3  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1304017
SUMMARY LO TAX      1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1304020
SUMMARY HI TAX      2  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1304021
SUM NO AT LO        1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1304022
SUM NO AT HI        1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 1304023
CONCEPTS ATTRIB     1  2  4  5  6  7  8  9 10 11 12 13 14 20 21 22 23 24 40 41 42 43 44 45 50 51 60 70 1504027
09 LOW TAX LEVEL    1  0  2  0  2  0  0  0  0  0  2  0  0  0  0  0  0  0  0  0  0  1  1  0  0  0  0  1 1504056
09 HI TAX LEVEL     5  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  4  0  0  0  0  0 1504057
09 NO AT LOW        1  0  1  0  1  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0  0  1  2  0  0  0  0  1 1504058
   TAX
09 NO AT HI TAX     1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0  0  0  0  0 1504059
```

Figure 6

ed by its author, the decision was made to place a low priority on the development of this program.

The volume of information generated by this analysis was rather large and of specific interest to a small audience. Hence, it was not reproduced in this report. The American Industry Project, however, does retain copies of the output.

Analysis of the data generated by the lesson analysis indicated that the objectives specified in the original plan for the guide were adequately met. Some omissions were observed and steps have been taken to revise or add to the lessons to remedy these problems. Feedback from the teachers, which is discussed in the next sections, also confirmed this finding.

Description of the Feedback System

The American Industry instructor's guides were designed and constructed to aid the American Industry teachers. In fact, their comments and experiences were a valuable input into the planning of these guides. For example, the inclusion of more content, activity sheets that are easily reproduced, and the integration of the narrative for the media in the guide came as a result of suggestions by the participating teachers. Thus, feedback from the practitioner had provided valuable data. However, after the last revision of the Level I guide, there was a need for more specific information upon which to base the more subtle refinements that would be required in the future. In other words, future decisions would require more definitive data than the general information produced by the original, somewhat informal , feedback system.

An analysis of the judgments that would be required in further developmental work on the guide assisted in delineating the characteristics of the new feedback system. Information had to systematically collected on appropriate sub-sets of the instructional materials. This suggested that feedback should be related to each lesson and Unit. Larger segments would be difficult to rate and would provide less specific data.

Nature of the Feedback Forms

In addition to being systematic and precise, the system had to provide valid data for the decisions encompassed in curriculum development. Hence, the lesson and Unit feedback forms were designed to collect information on such factors as the amount of time consumed by the lesson, the quality of the content outline, and the value of the activities provided. Also, the curriculum specialist was interested in the sequence of content from lesson to lesson and the appropriateness of the unit structure.

The complete lesson feedback form is presented in Figure 1 and the unit feedback form is reproduced in Figure 2. Note that there are response statements to check and a place to add comments. This format provided specific data that the curriculum specialist needed and allowed the person completing the form to add his own judgments and reasons for his responses. Another important characteristic to note is the fixed responses for most of the items do not fall in a continuum. Rather, they were written to provide specific information. For example, item

LEVEL II
LESSON FEEDBACK

Curriculum Feedback Information
American Industry Rev. 2/20/68

Now that you have completed this lesson, please complete this form and mail it to Richard Gebhart, American Industry Project.

Check the appropriate statements and comment as requested. Note: In some cases more than one statement may be checked.

If you need more room for comments, attach additional pages.

Instructor ______________________ *Date* ______________________

Unit Number __________ *Lesson Number* __________ *Date Lesson Started* __________

1. *Amount of time used to complete lesson (to nearest ½ class period)* __________

2. *Overall, this lesson is ranked as (a)*☐ *excellent, (b)*☐ *good, (c)*☐ *fair,*

   (d)☐ *poor. If (c) or (d) explain* ______________________

   ____

3. *The objectives of this lesson are (a)* ☐ *clearly defined, (b)* ☐ *adequate*

   (c) ☐ *not clear, (d)* ☐ *too broad, (e)* ☐ *too brief. If (c), (d), or (e) explain.*

   ____

4. *The scope in this lesson (a)* ☐ *described the lesson clearly, (b)* ☐ *did not describe the lesson. If (b) explain* ______________________

   ____

5. *The content outline (a)* ☐ *was logical, (b)*☐ *contained adequate detail,*

   (c)☐ *was not logical, (d)*☐ *did not contain enough information. If (c) and/or (d) explain* ______________________

   ____

6. *Which activity did you use?*

   The activity used in this lesson (a)☐ *was adequate, (b)*☐ *was not adequate,*

   (c)☐ *was developed by the instructor. If (b) or (c) explain* ______________________

   ____

(Be sure to fill out the items on the reverse side.)

Fig. 1 Level I Lesson Feedback Form: 1967-68 Version

LESSON FEEDBACK

7. *The evaluation items (a)* ☐ *were adequate, (b)* ☐ *were not enough of them (c)* ☐ *were unrelated to the lesson, (d)* ☐ *none in the lesson, (e)* ☐ *were developed by the instructor. If (c) explain, if (e) send copies of the items* ____________________

8. *This lesson (a)* ☐ *fit into the sequence of other lessons in this unit, (b)* ☐ *did not fit into the lesson sequence. If (b) explain* ____________________

9. *The suggested student reading from the student booklets (a)* ☐ *helped to meet the objectives of the lesson, (b)* ☐ *had little relevance to the lesson, (c)* ☐ *was not used. If (b) or (c) explain* ____________________

10. *The suggested outside references (a)* ☐ *were used and found helpful (identify), (b)* ☐ *were not used, (c)* ☐ *other outside references were used. If (a) or (c) explain or list the references.* ____________________

____

11. *The media suggested for this lesson was (a)* ☐ *effective, (b)* ☐ *ineffective (c)* ☐ *none used.*

12. *Did you develop any of your own media? (a) yes, (b) no. If you did, was it effective? (a)* ☐ *very effective, (b)* ☐ *effective, (c)* ☐ *ineffective (d)* ☐ *poor. Send a copy or description of your media to the Project.*

13. *List any films used with this lesson and rate them as (E) excellent, (G) good, (F) fair, or (P) poor* ____________________

____

LEVEL II
UNIT FEEDBACK

Curriculum Feedback Information
American Industry Rev. 2/20/68

Now that you have completed this unit, please complete this form and mail it to Richard Gebhart, American Industry Project.

Check the appropriate statements and comment as requested. Note; In some cases more than one statement may be checked.

If you need more room for comments, attach additional pages.

Instructor ____________________________ *Date* ____________________

Unit Number ____________ *Date Started* ________ *Date Completed* ____________

1. *The approximate time spent in laboratory was* ________*%.*

2. *Generally, this unit was found to be (a)* ☐ *excellent, (b)* ☐ *good, (c)* ☐ *fair,*

   (d) ☐ *poor. If (c) or (d) explain.* ____________________________

   ____

3. *The general unit objectives were (a)* ☐ *clearly defined, (b)* ☐ *adequate (c)* ☐ *not clear,*

   (d) ☐ *impossible to meet, (e)* ☐ *too broad, (f)* ☐ *too restrictive. If (c), (d), or (e)*

   explain ____________________________________

4. *Generally, the activities were found (a)* ☐ *adequate, (b)* ☐ *not suited to the lesson(s),*

   (c) ☐ *not enough of them. If (b) or (c) explain* ____________________

   ____

5. *The student booklet (a)* ☐ *provided enough background reading for the students, (b)* ☐

   should have contained more information (c) ☐ *did not fit together with the lessons.*

   If (b) or (c) explain ________________________________

6. *The instructional media for this unit was generally (a)* ☐ *effective, (b)* ☐ *ineffective.*

(Be sure to fill out the items on the reverse side.)

Fig. 2 Level I Unit Feedback Form: 1967-68 Version

UNIT FEEDBACK

7. *Give a general summary of your feelings about this unit. Include the strong and weak points you found.*

five on the lesson feedback form has the following response categories: a. "was logical", b. "contained adequate information", c."was not logical," and d. "did not contain enough information." Thus, if there were problems with sequence and detail in a lesson, the teacher could rate this. Moreover, these response choices focus the responder's attention on these facets of the content outline. In contrast, an ordered series of response positions, say from SA to SD, would not give as specific information on the material rated. If the reader is interested in the format and contents of the feedback sheets, these forms can be reviewed in Figure 1 and 2. Summaries of the feedback data will be presented in later sections of this paper.

Color coding was used on the feedback sheets to distinguish them from other materials. Blue paper was utilized for the first level form. Black and red inks were employed for the lesson and unit feedback forms respectively To further facilitate the feedback process, a lesson feedback form was placed at the back of each lesson and a unit feedback form was entered at the end of each unit when the instructors guides were collated. Hence, as each lesson or unit was completed, the teacher would encounter a feedback form.

Feedback Procedure

The Project's participating teachers were requested to fill out a feedback form as soon as feasible after a lesson or unit had been completed. Self-addressed enveloped were provided for returning the completed feedback forms to the curriculum specialist at the middle and end of each month. After a brief review of these forms, the curriculum specialist sent them to the project's key punch operator.

Two sets of data were punched for each feedback form. Figure 3 presents a card image of one record in the lesson feedback system file. The six fields on the left, columns one through sixteen, are used to identify the source, level, and type of data recorded in the remainder of the card. Unit feedback records utilize a similar format. (See Figure 4).

After the feedback cards had been punched, they were processed by means of the Total Feedback Summary Program. This program summarized and stored the information contained in the first six fields. A sample of the output from this program is given in Figure 5. From this printout one can identify the data forms and feedback sheets returned by each teacher. When these summaries are printed periodically, every two weeks on the Project, the progress and status of each teacher can be ascertained. The format of the output can be modified by use of parameter cards to include a maximum of fifteen units and up to thirty lessons in a given unit.

The information contained in this feedback summary form has been very valuable in monitoring the progress of the teachers and determining the status of the courses at a given time. It helped to identify teachers who were having problems or were slow in returning their feedback in time to take corrective action. In addition, it condensed and coordinated a variety of data related to the evaluation. As a result, the research and curriculum specialists could quickly obtain the information they needed.

The feedback system also provided a vehicle for the exchange of other ideas. Frequently the teacher would attach an activity sheet or test developed for his American Industry students.

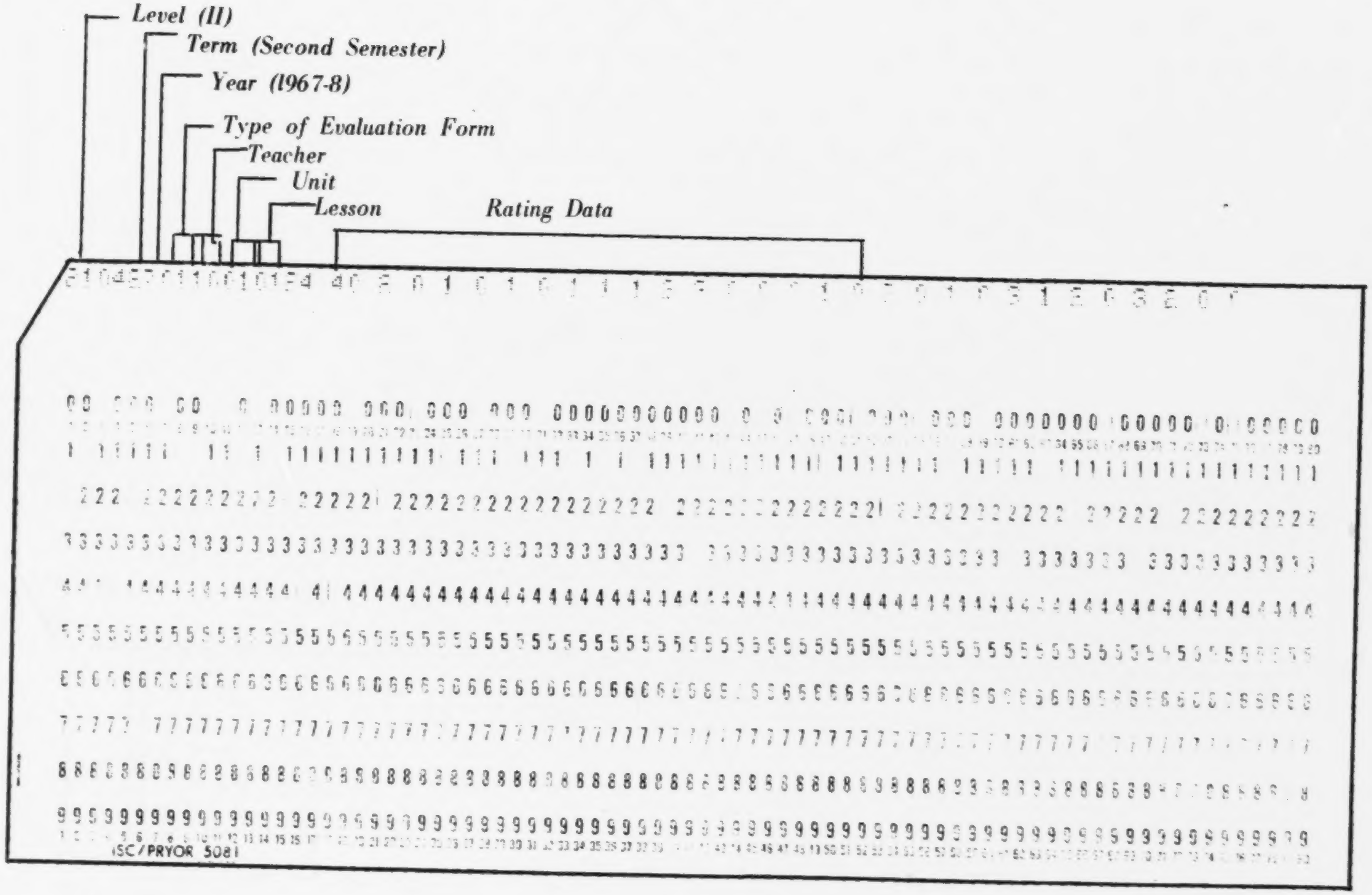
Level (II)
Term (Second Semester)
Year (1967-8)
Type of Evaluation Form
Teacher
Unit
Lesson
Rating Data
ISC/PRYOR 5081

Fig. 3 Lesson Feedback Card Image

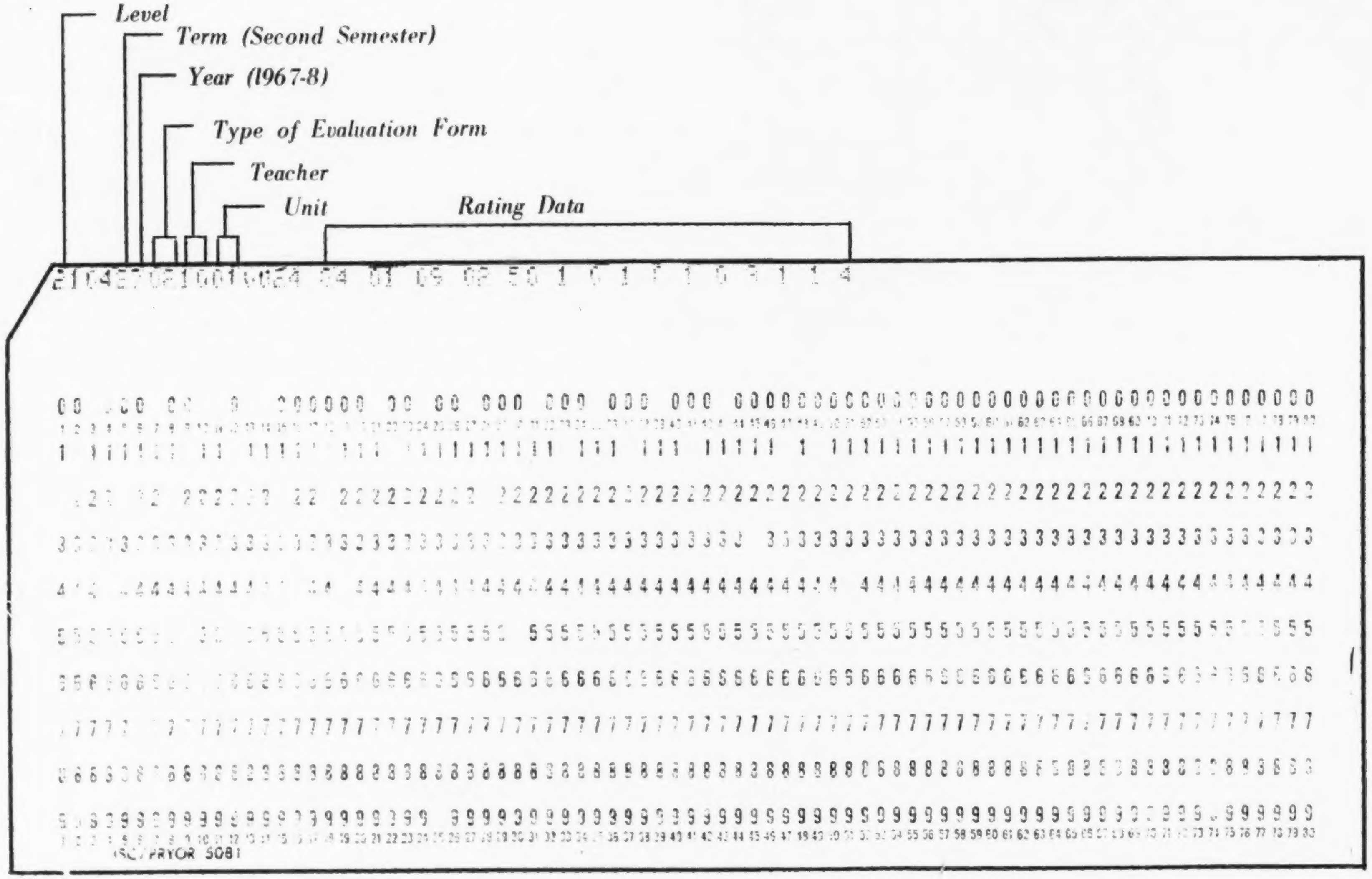
Level
Term (Second Semester)
Year (1967-8)
Type of Evaluation Form
Teacher
Unit
Rating Data

Fig. 4 Unit Feedback Card Image

```
09/23/68
                 PARTICIPATING TEACHER'S FEEDBACK SUMMARY

    32        IMHOFF ROGER        36 WKS
                                              LEVEL  1

                    STUDENT INFORMATION FORM - N       CLASS ROSTER - N

    GRADE SHEET - N    OCCUPATIONAL PREF FORM - R    CLASS OPINIONNAIRE -R

END-OF-YEAR REPORT - R    INSTRUCTORS GUIDE  -N

    UNIT 1-R         UNIT TEST - N     NELSON RATING SCALE - R   MEDIA FEEDBACK - N

MEDIA PACKET -N    STUDENT BOOKLETS - N

LESSON 1 - R LESSON  2 - R   LESSON 3 - R      LESSON 4- R

    UNIT 2 -R      UNIT TEST -N     NELSON RATING SCALE -R  MEDIA FEEDBACK -N

MEDIA PACKET - N    STUDENT BOOKLETS - N

LESSON 1-N    LESSON 2-R    LESSON 3-R    LESSON 4-R  LESSON 5-R

    UNIT 3-R    UNIT TEST -N    NELSON RATING SCALE -R    MEDIA FEEDBACK -N

MEDIA PACKET -N    STUDENT BOOKLETS -N

LESSON    1-R    LESSON    2-R    LESSON    3-R    LESSON    4-R    LESSON    5-R
LESSON    6-R    LESSON    7-R    LESSON    8-R    LESSON    9-R    LESSON   10-R
LESSON   11-R    LESSON   12-R    LESSON   13-R    LESSON   14-R    LESSON   15-R
LESSON   16-R    LESSON   17-R    LESSON   18-R    LESSON   19-R    LESSON   20-R
LESSON   21-R

   UNIT 4-R      UNIT TEST -N    NELSON RATING SCALE -R    MEDIA FEEDBACK -N

MEDIA PACKET -N     STUDENT BOOKLETS -N

LESSON    1-R    LESSON    2-R    LESSON    3-R    LESSON    4-R    LESSON    5-R
LESSON    6-R    LESSON    7-R    LESSON    8-R    LESSON    9-R    LESSON   10-R
LESSON   11-R    LESSON   12-R    LESSON   13-R    LESSON   14-R    LESSON   15-R
LESSON   16-R    LESSON   17-R    LESSON   18-R    LESSON   19-R    LESSON   20-R
LESSON   21-R    LESSON   22-R    LESSON   23-R    LESSON   24-R    LESSON   25-R
LESSON   26-R
```

Fig. 5 Feedback Summary Output

UNIT 5-R UNIT TEST -N NELSON RATING SCALE -R MEDIA FEEDBACK -N

MEDIA PACKET -N STUDENT BOOKLETS -N

LESSON 1-R LESSON 2-R LESSON 3-R LESSON 4-R LESSON 5-R
LESSON 6-R LESSON 7-R LESSON 8-R LESSON 9-R LESSON 10-R

UNIT 6-R UNIT TEST -N NELSON RATING SCALE -R MEDIA FEEDBACK -N

MEDIA PACKET -N STUDENT BOOKLETS -N

LESSON 1-R LESSON 2-R LESSON 3-R LESSON 4-R LESSON 5-R

UNIT 7-R UNIT TEST -R NELSON RATING SCALE -N MEDIA FEEDBACK -N

MEDIA PACKET -N STUDENT BOOKLETS -N

LESSON 1-R LESSON 2-R LESSON 3-R LESSON 4-R LESSON 5-R
LESSON 6-R LESSON 7-R LESSON 8-R LESSON 9-R LESSON 10-R
LESSON 11-R LESSON 12-R LESSON 13-R

NUMBERED OF FEEDBACK SHEETS RETURNED 89

The flow of this type of information increased with the adoption of the feedback system.

Up to this point, the discussion of the feedback procedure has centered on the collection of data and the methods used to inventory and store this information. The primary purpose of the system, however, was to obtain ratings on items placed on the feedback sheets. These ratings and comments are punched in the data fields to the right of the information retrieval fields. (These fields are identified in Figures 3 and 4.) After the cards were processed in the Total Feedback Summary Program, the ratings were summarized by lesson, unit and teacher. From these summaries, the characteristics of each lesson and unit can be determined and the teachers response tendencies can be estimated. A graphic summary of the feedback information flow is given in Figure 6. The analysis of these summaries will be discussed in greater detail in a moment; however, at this point consideration of the reliability and validity of the data collected in the feedback forms is appropriate.

Reliability and Validity of the Feedback Forms

Interpretations of data are contingent on their accuracy and the degree to which they relate to the variable being measured. The first attribute mentioned is concerned with reliability. The second deals with validity. Since the rating forms were comprised of a hetrogeneous set of items, internal consistency measures of reliability were not appropriate. However, the teachers with semester courses completed two sets of feedback forms for the lessons they taught.

These two sets of data provide the basis for a test-retest comparison to determine reliability. More specifically, this comparison is concerned with the stability of the ratings over time. In this instance the time period was about four months. Also, it is assumed that the teachers' perspectives did not undergo a significant change. For example, after completing the first semester the teacher might attain a Gestalt view of the course which could in turn affect his perception of specific lessons or units. Several factors mitigated against this event in feedback system. First the teachers had been thoroughly exposed to the philosophy and the objectives of the course during summer institutes. Second, the course was based on their prior comments and experiences. Hence, they should have had the overall view before teaching the first semester course.

The correspondence between the first and second ratings on the lesson feedback forms can be observed in Table 4. Only those items on which a stable rating could be expected are included in the table. Thus, for example, item six was not included since the activities could vary from one semester to the next. Items and response categories are given in Figure 1. Response "a" is represented by a I in all instances.

The agreement between the two sets of ratings on all items is sufficiently high to conclude that the feedback form produces relatively stable data. Three items of special interest are the ones dealing with the general rating of the lesson, item two; the rating of the objectives, item three; and the rating of the content outline, item five. On item two, 63 per cent of the ratings remained the same and less than 4.1 per cent changed as much as two response categories. Almost 91 per cent of the responses concerned with the objectives for the lessons are the same on both the initial and second ratings. Eighty-five per cent of the content outline ratings remained the same.

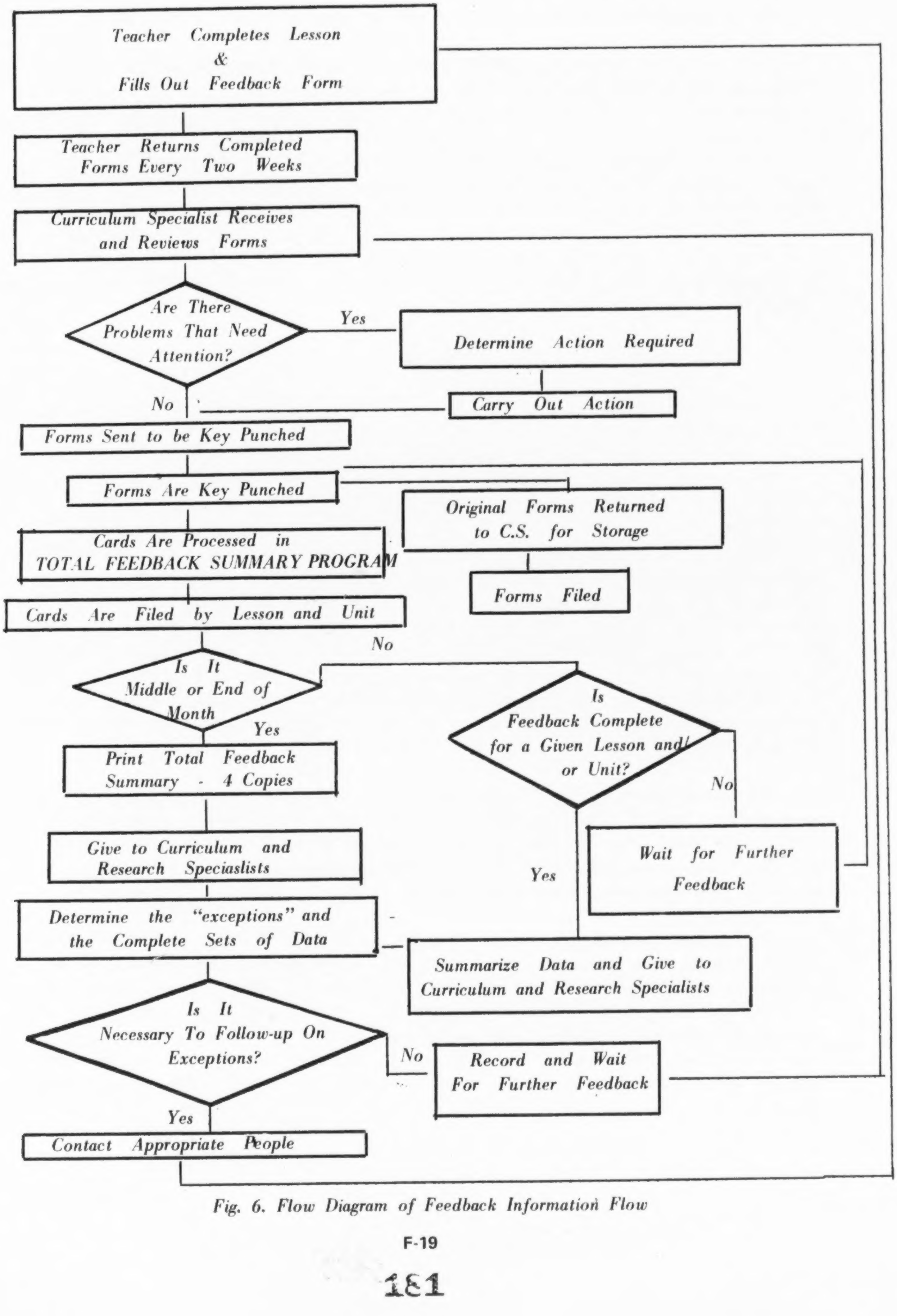
Teacher Completes Lesson
&
Fills Out Feedback Form
Teacher Returns Completed Forms Every Two Weeks
Curriculum Specialist Receives and Reviews Forms
Are There Problems That Need Attention?
Yes
Determine Action Required
Carry Out Action
No
Forms Sent to be Key Punched
Forms Are Key Punched
Original Forms Returned to C.S. for Storage
Forms Filed
Cards Are Processed in TOTAL FEEDBACK SUMMARY PROGRAM
Cards Are Filed by Lesson and Unit
No
Is It Middle or End of Month
Yes
Is Feedback Complete for a Given Lesson and/or Unit?
No
Print Total Feedback Summary - 4 Copies
Give to Curriculum and Research Speciaslists
Wait for Further Feedback
Yes
Determine the "exceptions" and the Complete Sets of Data
Summarize Data and Give to Curriculum and Research Specialists
Is It Necessary To Follow-up On Exceptions?
No
Record and Wait For Further Feedback
Yes
Contact Appropriate People

Fig. 6. Flow Diagram of Feedback Information Flow

TABLE 4

Comparison of First & Second Ratings of Lessons

First Rating

Response	1	2	3	4
1	2*	5	2	0
2	4	29*	5	0
3	0	2	0 *	0
4	0	0	0	0*

ITEM 2
63% of ratings are identical

First Rating

Response	1	2	3	4	5
1	50	1	2	0	0
2	1	0	0	0	0
3	1	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0

ITEM 3
90.9% of ratings are identical

First Rating

First Rating

Response	1	2
1	51	2
2	2	0

ITEM 4
92.7% of ratings are identical

First Rating

First Rating

Response	1	2	3	4
1	44	5	3	0
2	0	1	0	0
3	0	0	1	0
4	0	0	0	0

ITEM 5
85% of ratings are identical

First Rating

Responseq	1	2
1	55	0
2	0	0

ITEM 8
100% of ratings are identical

First Rating

Response	1	2
1	31	4
2	1	1

ITEM 9
86.5% of ratings are identical

* Numbers in this diagonal represent identical ratings.

On the basis of the data collected, the responses to the feedback items appear to be stable. Certainly their reliability was adequate for the types of decisions that were based upon them. Another question, however, needs to be answered before these responses can be used. This question pertains to the validity of the data.

The feedback system was conceived and implemented to generate data related to the quality and operating characteristics of the instructional materials. Therefore, if the ratings are valid, they should vary with the quality and characteritics of these materials. Three evaluations of this relationship were possible in the present set of data.

First, item seven in the lesson feedback form has provision for rating evaluation items if they appeared and for noting that there were no items in the lesson. (A sample feedback form is given in Figure 1.) Several lessons in the guide did not contain evaluation items. Hence, for these lessons, the "no items" choice should be checked. A comparison of the responses to item seven for the lessons without evaluation items and the responses for a random sample of the lessons with evaluation items gave the results depicted in the contingency table below. If the responder checked any of the first three responses to item seven, he was included in the column labeled "Quality of Evaluation Item Rated" since these choices referred to the quality of the evaluation items. If he checked response "d" he was placed in the column labeled "none in the lesson." The status of the evaluation items in the lessons is represented in the rows. Perfect agreement between the ratings and the status would require that all of the responses would fall in the upper left and lower right cells.

Status of the Lesson	RATING	
	Quality of Evaluation Items Related	"None in the lesson" (Choice d)
Has Evaluation Items	105	6
Does Not Have Evaluation Items	5	23

Although the data do not reveal perfect correspondence, the (phi) coefficient for this set of data is .76. Using the formula, $x^2 = N2$, a value of 80.6 is found for χ^2 (Hays, 1963). The probability of obtaining an χ^2 value this large if the ratings and the status of the lesson were not related is less than one in one thousand ($P < .001$). Hence, there is a significant statistical relationship between the ratings and the status of the lesson.

Another check on the validity of the feedback responses involves the comparison of the ratings for the lessons in Unit II against those for the lessons in the other units. Unit II lessons, based on the history of industry, provided a number of developmental problems. And, when they were done it was the opinion of the Project staff members that these were the weakest lessons. Thus, if the information collected on the feedback form is valid, the ratings for these lessons should be lower than those for the lessons in the other units. A summary of the responses for item two in the lesson feedback form is given below. Column "a" represents a rating of "excellent", and "d" is "poor." The percent selecting each rating is given in the parenthesis.

Response Categories

Unit	a	b	c	d
II	6(14.6)	25(61)	8(19.5)	2(4.9)
I & III-VII	168(32.3)	311(59.8)	33(6.3)	8(1.5)

Comparing these distributions with the Kolmogorov-Smirnov Two-Sample Test (Siegel, 1956) disclosed that the probability that the ratings for Unit II were from the same distribution as the ratings for the remaining Units is between .10 and .05 ($.10 > P > .05$). Therefore, the ratings appear to be somewhat sensitive to a variation in quality.

The average unit ratings for each of the seven units in the first level course are graphically depicted in Figure 7. These averages are based on the teachers' responses to item two in the unit feedback form (Figure 2) for each unit. A comparison of the responses, number and per cent, for Unit II and the remaining units is presented below.

Response Categories

Unit	a	b	c	d
II	0(0)	9(69)	3(23)	1(8)
I & III-VII	16(39)	21(51)	4(10)	0(0)

Using the Kolmogorov-Smirnov Two-Sample Test, it was found that the probability that these two sets of ratings came from the same distribution is less than five chances in one hundred ($P < .05$).

Both of the validity tests on the lesson feedback indicate that these forms return valid data. The validity test for the unit feedback form also was positive. Unfortunately, there were not enough unit feedback sheets from the semester programs to determine the reliability of this form. However, since the unit form is very similar to the lesson feedback form, there is no reason to believe that it is not reliable.

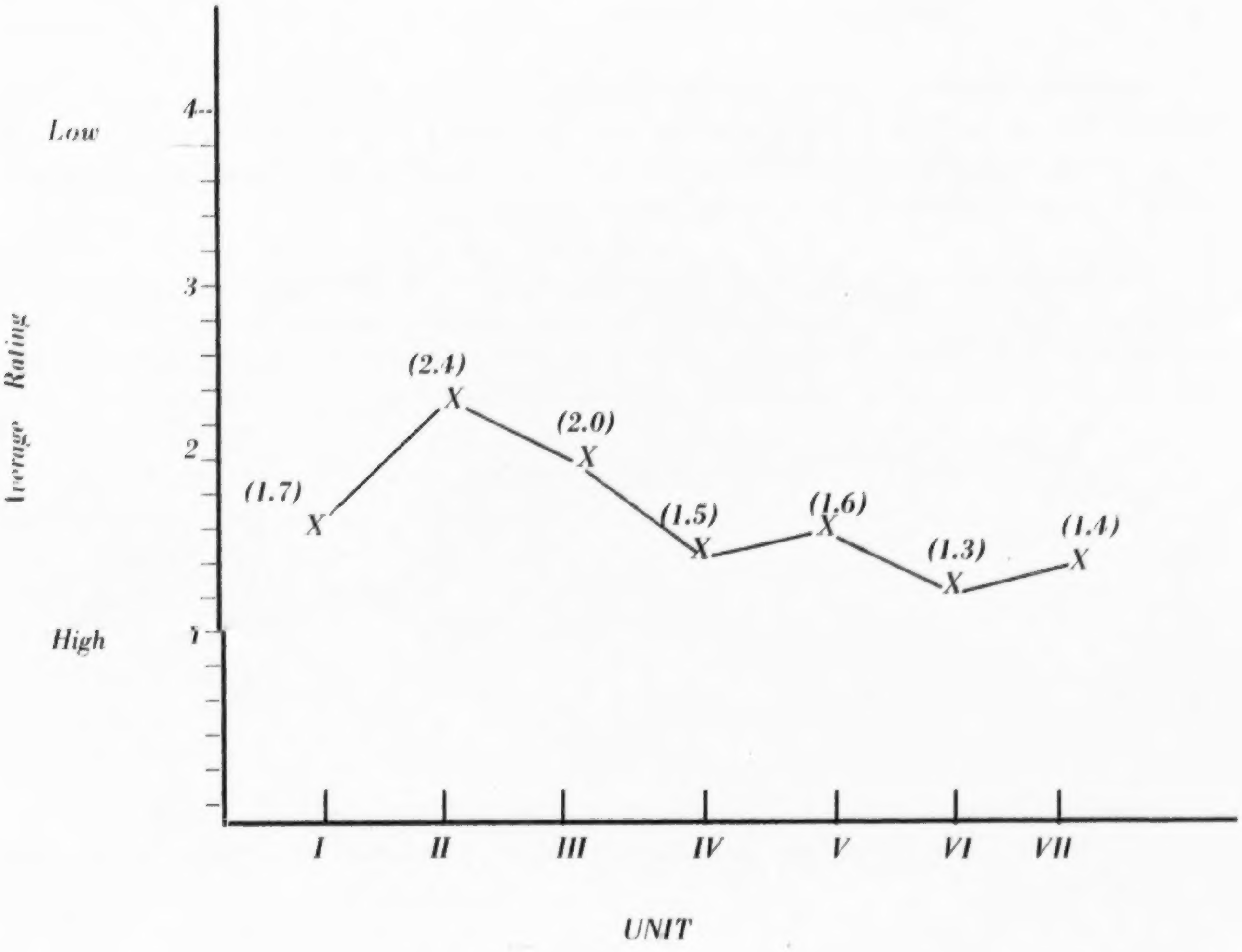

Fig. 7. Average Unit Ratings for Level I

A Definition of the Ratings

Before the data from the feedback forms are analyzed and discussed, it is important that the meaning of the ratings be defined. Responses on the feedback forms are conceptualized in the following formula.

$$R = f(A.Q. + R.R.T.)$$

In this formula, R represents the rating or response, A.Q. is the actual quality of the material rated, and R.R.T. is the responder's rating tendencies. Since R is the rating, it will be found on the completed feedback forms. R.R.T. is a measure of the responder's tendency to be an easy, average, or difficult rater. For example, a lesson might be rated as "good" by a lenient rater and "fair" by a conservative rater. Yet, the quality of the lesson remains the same and it would most logically be located between these two ratings.[3]

Assuming that later response tendencies are random and normally distributed around $\overline{X}_{..}$ for our sample of participating teachers, R.R.T. for a given rater can be estimated by $\overline{X}$ rater i. $\overline{X}_{..} = R_{i}.R.T.$ In other words, the estimate of R_i. R.T. is the difference between the average rating given all lessons by a rater, $\overline{X}_{\text{rater } i.}$, and the average rating given all lessons by all raters, $\overline{X}_{..}$. In $\overline{X}_{..}$ the sum of the rater response tentencies is zero since the easy and concervative ratings cancel each other.

A second assumption encompassed in $R_i.R.T. = \overline{X}_{\text{Rater } i.} - \overline{X}_{..}$ is that the interaction of lesson quality and teacher background in normally distributed around $\overline{X}_{\text{Rater } i}$. In other words some lessons may be difficult because the teacher lacks the proper background while others are very easy for the inverse reason. The fact that the first level American Industry course deals with gross concepts and skills lends credence to this assumption. Moreover, the teachers had in-service training which should also reduce the interaction factor.

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[3] This assumes that there is no interaction between the teacher's knowledge and abilities and the nature of the lesson. In practice this probably will not be true. However, A.Q. as defined in the first formula given above will include this interaction component. Calculation of R.R.T. will show why this is true.

The actual quality of lesson indicated by a specific rating is:

$$A.Q._{i1} = R_{i1} - R_i.R.T.$$

Assuming that the $\sum_i^N R_i.R.T. = 0$, then the actual quality of a lesson 1 is $\frac{\sum_i^N R_{i1}}{N}$ or the average of the ratings for the lesson.

The preceding formulas apply primarily to items measured on interval or ratio scales and to a lesser extent to ordinal scales. Item two on the lesson feedback form and items two and seven on the unit feedback form involve measurement at the ordinal level or higher. However, the rater response tendency, R.R.T., found on these items will give a general indication of the response tendencies on the other items in the forms.

For those items in which the response categories do not lie on a continuum, the response frequencies for each response position found in the total summary of the ratings for all lessons or units can be utilized as the criterion. Item five in the lesson feedback form provides an example of an item in which the responses do not constitute a continuum. The total frequencies and associated percentages (in parentheses) for all of the responses to this item are given below.

Response						
a	b	c	d	a+b	a+d	c+d
442(80.2)	48(8.7)	11(2.0)	35(6.3)	13(2.4)	1 (.2)	1 (.2)

The relative quality of the content outline of a given lesson can be assessed by comparing its rating to the response distribution above. A large number of low ratings indicate a need to review the lesson. However, even one low rating my be the signal to review the lesson if that response was given by a very perceptive teacher. Usually though, one or two low ratings indicate that the raters may require some assistance with the material involved.

Up to this point, the lesson ratings have been analyzed on the basis of rater response tendencies, R.R.T., and the actual quality, A.Q., of the lesson or unit as perceived by the rater.

These ratings represent the teacher's opinions of the lessons and units. Or, to look at this in another way, the variable being measured in teacher opinion. This variable is most likely comprised of factors that relate to types of instruction typically used by the teacher, his ability to adapt to structured materials and courses, his educational preparation, his work experience, his interest in innovation, and the way his students react to the material. For the most part, these ratings give little evidence on the quality of the concepts and rationale that undergird the course. This information will come from a logical analysis of these elements and measures of the outcomes that result from the study of American Industy.

Results and Discussion

As evidenced by the data and forms presented in the previous discussion, a large variety and volume of information were collected through the feedback system. Since detailed analyses of these data are primarily of value to the curriculum specialist, the ensuing comments will be concerned with reports on the more general characteristics of the instructor's guide for the first level American Industry course. Selected uses of these data in future revisions of the material evaluated and the developmental process will also be discussed.

A.Q. of Lessons and Units

The actual quality (A.Q.) of the units and lessons are listed in Table 5. Values in the table are based on responses to item two on the lesson and unit feedback forms. On both forms, this item requests the rater to indicate the general or overall quality of the material being evaluated. The response categories on this item "excellent", "good," "fair," and "poor" were represented by numbers one through four respectively in the calculations of the A.Q.'s.[3] Hence, a lesson or unit of high quality will have an A.Q. with a low numerical value with the maximum rating being one.

Table 5 also lists the number (N) of ratings summarized to obtain each A.Q. In general, as N increases the A.Q. associated with it should become more stable. Several factors influenced the N's found in the table. Semester programs used only a portion of the lessons in Units II

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[3] A.Q. for lesson 1 $= \frac{\sum_{i}^{N} R_{i1}}{N}$

TABLE 5

Actual Quality of Units and Lessons In the Level I Instructor's Guide

Unit		Lesson Number																									
Number	A.Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
I	1.7 18	1.7 19	2.1 18	2.0 18	1.5 14	*																					
II	2.4 11	2.4 13	2.0 9	2.4 9	2.2 6	1.5 6																					
III	2.0 10	1.5 15	2.1 13	2.1 12	1.3 8	1.2 6	1.9 12	2.4 11	2.0 3	1.8 6	1.5 15	1.9 7	2.0 5	1.8 15	1.8 12	1.9 7	1.9 14	1.8 5	2.0 5	2.0 12	1.8 11	1.8 5					
IV	1.5 2	1.7 11	1.6 5	1.8 4	1.6 11	1.8 9	1.3 3	1.5 4	2.0 9	1.9 9	1.7 13	1.6 5	1.8 9	2.0 8	2.0 6	1.8 5	1.8 5	---	1.9 7	1.4 7	1.9 7	2.0 5	1.8 4	2.3 1	1.3 1	1.0 3	1.5 2
V	1.6 5	1.7 7	1.9 7	1.6 13	1.5 4	1.7 3	1.0 3	1.8 6	1.1 7	1.7 3	1.7 3																
VI	1.3 3	1.6 5	1.5 2	1.0 1	1.5 2	1.5 2																					
VII	1.4 5	1.4 8	1.5 4	1.5 4	1.4 4	1.6 7	1.7 3	1.7 3	1.3 3	1.0 1	1.0 1	1.0 1	2.0 2	1.7 3													

$\overline{X}$ Units = 1.83 $\overline{X}$ Lessons = 1.79 * Numbers in Cells are $\frac{A.Q.}{N}$

through VI. Some teachers did not have time to complete Unit VII. And, some teachers failed to return the feedback sheets. This failure was especially hard to correct in Unit VII since it came at the close of the school year. As a result, the reader will have to consider the size of the N in each A.Q. as he reviews the ratings.

The data in Table 5 were reviewed and analyzed to provide the information required to answer the two basic questions emcompassed in developing and revising the curriculum materials.

1. What segment of the instructional materials is most in the need of revision?
2. Which combination of curriculum development efforts will have the maximum influence on the total instructional system?

The first question can be answered by isolating the largest A.Q.'s in the table. (Note the A.Q.'s for the lessons one through four in Unit II and the Unit II A.Q. for example.) In addition, a sequence of high values may indicate a topic that is being treated less effectively than the other topics in the guide. Other revision candidates include the lessons and units with A.Q.'s above the average rating for all lessons, 1.79, and all units, 1.83. For example, an A.Q. of 2.00, although it indicates a rating of "good" on the scale, is based on the responses of several teachers and these may contain a number of "fair" and "poor" ratings. In practice, then, high A.Q. values provide clues to the lessons or units that need further review. An analysis of the response frequencies in each response category for the materials in question will reveal the number of low ratings given and a study of the comments on the feedback forms for the lesson or units will further define the problem if one exists.

Another way to conceptualize the A.Q. values is to view them as sample means from a statistical quality control procedure. Assuming that the average quality of the lessons is $\overline{X}$, any A.Q. that exceeds $\overline{X} + 3\frac{s.d.\overline{X}}{\sqrt{N}}$ is significantly lower in quality than the average quality of the lessons (Burr, 1953). To illustrate this, consider the A.Q. of 2.00 for lesson two in Unit II. The control limit for this sample is $1.79 + \frac{3(.64)}{\sqrt{9}} = 2.43$. Since the A.Q. is less than this value, the lesson would be within the control limits. However, the series of four above average A.Q. values for the first four lessons would signal possible problems in these lessons.

Analysis of Responses to the Remaining Items on the Forms

The ratings and comments listed for items three through eleven in the lesson feedback form and three through seven in the unit feedback form provide information on specific aspects of the materials being evaluated. (Copies of these forms are given in Figures 1 and 2). Analysis of the responses to these items can help to isolate specific causes of low ratings given to the general quality of the materials (item two in the forms). Also, it is conceivable that the general quality of a unit or lesson may receive a favorable rating while one or more of the specific qualities may be a guide to correcting the materials with the most serious defects; however, more subtle refinements will require an item by item analysis of the responses to the specific items in the feedback forms.

Since the response categories for item three and those after it do not constitute a continuum, the A.Q. procedure used for item two is not appropriate. Instead, the response patterns to each item will be utilized and the summary of responses for all lessons and units will be used as the criterion. Consider, for example, the comparison of the ratings of the objectives in lesson two of Unit II to the total response pattern on this item. Item three in Table 6 presents the summary of all of the responses to this item. Whereas 3.4 per cent of the total responses indicate that the objectives are too broad or not clear, twenty-two per cent of the responses on the feedback for lesson two in Unit II list this rating. Similarly, on the item concerned with the content outline, item five, 6.7 per cent of the total responses indicate that the content does not contain enough detail and 11.1 per cent of the ratings on lesson two indicate this defect. Thus, these specific ratings confirm the problem indicated by the A.Q. for lesson two and suggest two possible causes for the low rating.

Statistical quality control procedures can also be applied to these items. Since they are concerned with the attributes of lessons and units, the fraction defective procedure can be employed to analyze the response data (Burr, 1953). The data in Tables 6 and 7 can be used to calculate the proportion of ratings in each "defective" category listed for items three through eleven and three through seven on the lesson and unit rating forms. A "defective" category is one that indicates a limitation of the material rated, for example, response "d" in item three on the lesson feedback form indicates that the objectives were too broad.

TABLE 6

Summary of Responses on the Lesson Feedback Forms For the Level I Instructor's Guide

	Statement Rated	o	a	b	c	d	e	f	g	h
2.	Overall , this lesson is ranked	34	174	336	41	10				
3.	The objectives of this lesson are	33	526	16	16	4				
4.	The scope in this lesson.	35	542	17						
5.	The content outline	44	442	48	11	35	13	1		1
6.	The activity used in this lesson	204	284	35	50	13				
7.	The evaluation items	92	274	70	2	117	32	3		
8.	This lesson	49	538	8						
9.	The suggested student reading from the student booklets.	75	377	53	86					
10.	The suggested outside references	99	36	448	6	3	1			
11.	The media suggested for this lesson	79	263	12	241					
12.	Did you develop any of your own media? . .	85	64	443						
13.	List any films used with this lesson . . .	541	48	5	1					

Table 7

Summary of Responses on the Unit Feedback Forms
For the Level I Instructor's Guide

Statement Rated	*Rating*				
	0	*a*	*b*	*c*	*d*
2. Generally, this unit was found to be		*16*	*30*	*7*	
3. The general unit objectives were	*1*	*50*	*1*	*1*	
4. Generally, the activities were found	*2*	*39*	*4*	*7*	
5. The student booklet	*3*	*35*	*13*	*7*	
6. The instructional media for this unit was generally	*9*	*43*	*13*	*2*	
7. General comments on the unit (tone) . . .	*6*	*7*	*26*	*8*	*6*

Determination of the control limit for the rating of the content outline for lesson two is done as follows. The fraction defective, p. for the content outline lacking enough information, choice c, is the number of responses in category c divided by the total number of ratings given to this item, $\frac{N_c}{N_R}$. In this example, p = .067. The control limit is given by $p + 3\sqrt{\frac{p(1-p)}{N}}$. For lesson two, the control limit is $.067 + 3 \frac{.067(.933)}{9}$ which equals .092 or 9.2 per cent. Since 11.2 per cent of the ratings for this item on lesson two fell in this "defective" category, the amount of information in this outline is not adequate.

The previous paragraphs have demonstrated a general and statistical approach to the analysis of the information collected on the feedback forms. Choice of an analysis method will depend on the amount of sophistication required. If there is limited time and resources available to revise materials, the general approach will allow one to determine the segments of the guide that are most in need of further input. The general approach has been used on occasion by the research specialist and has produced satisfactory results.

Decision-Making Based on the Feedback Data

An important factor to remember when reviewing the tables and figures in this paper is that data do not make decisions. People make decisions and, hopefully, these decisions are based on appropriate information. Therefore, poor ratings for a given lesson or unit do not necessarily mean that revision of this material is the appropriate course of action. Other evidence may indicate that the material is logical and correct. Hence, it may be the teacher that needs revision. An illustration of this is found in the rating of the content outline for lesson two in Unit II which deals with the history of industry. The outline could be made very detailed or the teachers could receive some in-service training on this topic. The first course of action will solve the problem with the lesson in question. The second approach will make the teacher more competent in the general area and, thus, should facilitate the utilization of the other lessons on history.

Before leaving the decision-making discussion, it should be noted that positive ratings do not constitute absolute evidence that a lesson or unit is the best means to reach a stated objective. Other inputs are required. Student performance, content validity, and logical consistency are equally important.

A review of the data in Tables 5, 6 and 7 will give a general indication of the quality of the instructional materials in the first level instructor's guide. The A.Q. values in Table 5 indicate that Unit II, lesson seven in Unit III, and lesson twenty-three in Unit IV require further investigation and possible revision. Considering the number of lessons in the guide, the small number of negative ratings is impressive. In addition, the average ratings for all lessons, 1.79, and all units, 1.83, support the quality of the instructor's guide.

Analysis of Lesson Ratings

Analysis of ratings for the remaining items in the lesson feedback forms confirm this positive evaluation of the lessons. Less than 4 per cent of the responses indicate that the objectives for the lessons are not clear or are too broad. When the responses for the lessons are not clear or are too broad. When the responses for the lessons in Unit II, lesson seven in Unit III, and lesson twenty-three in Unit IV are subtracted from this total, this figure falls below 3 per cent. And, only two of the remaining lessons in the Level I Instructor's Guide receive as many as two responses in this category. Obvisouly, there are few problems associated with the manner in which the objectives are stated in the guide.

A review of the responses on item four in the lesson feedback revealed that the lesson scopes were concisely written. Approximately 97 per cent of the responses agreed that the scope clearly defined the lesson. Only lesson two in Unit II received as many as two negative ratings on this item. In addition, the teachers' comments disclosed that the scopes were a valuable part of the lessons.

A study of the data for item five indicated that about 8.7 per cent of the responses rated the content outline as not having enough information or not being logical. Omitting the lessons in Unit II, so single lesson received more than two negative ratings. Also when the ratings for these lessons are removed from the totals, the number of negative responses to the remaining lessons drops below 7.5 per cent. The scattered pattern of the negative responses on this item when Unit II is not considered suggests that supplementary information or instruction for individual teachers would be a more efficient approach than revision of the lessons.

Comments and ratings made by the teachers indicated the need for more activities to bring out the concepts. In fact, a number of the teachers developed supplementary activities, response c, to facilitate their instruction. Response to the activities included in the lessons, however, was quite favorable. Almost 75 per cent of the responses rated the activities as being adequate.

Most of the teachers were satisfied with the evaluation items. About 80 per cent of the responses were favorable. Less than 1 per cent of completed forms include a response to the effect that the items were not related to the lesson. Several teachers commented that more items should be included and that unit tests were very useful. This obviously is an area in which substantial improvement can be made in the guide.

Eight responses, about 1.5 per cent, denoted that a lesson was out of sequence. Four of these dealt with the sequence in Unit I. On the basis of these data and comments from the teachers, the sequence was revised to parallel the use of the student enterprise activity in Unit I with lessons two and three. Subsequent feedback disclosed that this modification worked effectively.

Slightly more than 12 per cent of the responses related to the use of the student booklets indicated that they had little relevance to the lesson (Item nine). Frequently this rating was accompanied by comments suggesting that the lessons should be based on the booklets. In addition, one-sixth of the "not relevant" ratings were contributed by two teachers who had classes comprised of disadvantaged students. The first cause of negative responses requires instruction in the function of the booklets. The second gives evidence of a need for alternate reading materials for special groups. When lessons contained specific page references in the student booklets, these reading assignments were used in approximately 97 per cent of the cases. And, frequently when specific pages were not identified the teachers complained that the lessons were not correlated with the booklets. The value of specific reading assignments is apparent.

Many lessons contained references to books, periodicals, and pamphlets in addition to or in place of assignments in the student booklets. Examination of the responses to item ten reveals that about 7.9 per cent of these references were used by the teachers. Responses to a random sample of lessons were analyzed further to determine the frequency of use of various types of references. In general, the outside references can be classified in two categories based on their availability to the classroom teacher. Some of the items, such as newspapers and popular magazines, were readily available. Others, such as technical books and journals, would require special ordering or use of the school library. The contingency table presented below shows the relationship between usage and availability.

		Rating	
		Were used	Were not used
Availability	Not readily available	8	90
	Readily available	6	34

A chi square test indicated the possibility of a slight degree of relationship between availability and use, $.25 > P > .10$, but this value did not attain the levels of significance commonly used to judge a relationship as being significant. In addition to the low utilization of the references listed, slightly less than 2 per cent of the response forms indicated that the teacher had found and used outside references other than those listed. The low rate of utilization of reference materials from common and technical publications presents an obvious problem for these are some of the best sources of current information and thinking on industry. In addition, they provide real-life referents for the ideas discussed in class. Additional work is needed to encourage the teachers to make use of these resources.

Approximately 4.4 per cent of the ratings on the media provided in the instructional materials package for the first level course evaluated the instructional media as being ineffective (Item eleven). The media for lesson three in Unit I were the only ones to be related low by more than one teacher. Most of these negative comments pertain to one of the original slide series done by the Project. From this rather gross assessment, the media appear to be a valuable part of the instructional materials provided to the teacher. John Zuerlein's (1969) paper discusses the nature of the media and the teachers' evaluations in greater depth; thus, this paper will not go into detail in this area.

The last two items on the lesson feedback form pertain to the number of media developed by the teacher and the number of films used in conjunction with the lessons. About 13 per cent of the response forms noted that the teacher had designed and produced his own media. Most often these were in the form of overhead transparencies. A variety of films were projected. The primary problem with these was to schedule them at the appropriate time. Because of this scheduling problem, little emphasis was placed on the use of films in Units III through V. Since the content of the remaining units is more general, the scheduling problem was diminished for them.

Analysis of Unit Ratings

In prior pages, the overall rating of the units has been discussed and analyzed. Thus, it is not necessary to restate that material here. Before going on to item three, brief mention should be made of the responses to the first item on the feedback form. This item asked the responder to list the amount of time spent in the laboratory (See Figure 2). The lack of systematic feedback of the unit forms makes the data on this item very difficult to interpret. In general, the responses to this item and comments by the teacher indicate that there is a need to develop more effective use of the laboratory--especially as it relates to the development of concepts. Several teachers, for example, complained of the problem they had as their students went into production in the shop and suggested that a unit on shop orientation should open the course. One should expect problems starting a new production run. In fact, industry typically encounters these problems. That is the reason for the pilot production run. What better opportunity exists for teaching the importance and general techniques involved in planning, following plans, working together, and operating equipment?

Interpretation of the response patterns on the remaining items on the Unit feedback forms is also hampered to some degree by the lack of responders. However, when the responses are pooled for all units some observations can be made about the general unit structure in the course. Data upon which the ensuing comments were based are reproduced in Table 7.

A high rating was given to the unit objectives. The sole negative response was given to Unit II. With the exception of Unit II, there appears to be little room for improvement here.

Most of the responses, 78 per cent, indicated that the activities included in the units were adequate (Item four). Several teachers also noted the need for more activities. This coincides with data and comments made in previous parts of this paper. There is an obvious need to design lab activities that develop the concepts of industry.

Seventy per cent of the responses listed the student booklets as providing adequate background reading for the students. Twenty-six per cent suggested that they should have contained more information. Only 4 per cent indicated that the booklets did not fit together with the lessons. Interpretation of these responses depends on the assigned function of the booklets in the instructional process. They were written primarily to portray an industry in action and provide referents for the ideas discussed in the lesson. However, some teachers thought that they should be "how-to-do-it" books. There may be a need for a separate manual to present the "how-to."

Assessment of the media in the units was very favorable. This substantiates the media ratings given in the lesson feedback form. Apparently, the decision to emphasize overhead transparencies was favorably received.

Item seven in Table 7 gives the rating of the tone of the comments submitted by the teachers. Category "a" contains the number of forms that listed highly favorable comments. Categories "b", "c", and "d" represent favorable, neutral, and unfavorable respectively. Four of the six negative ratings were given to Unit II. Thus, the remaining units received a favorable rating.

Special Analyses

During the design of the instructor's guide for Level I, special provisions were made in order to secure information related to three questions of interest. First, the curriculum specialist was concerned about the amount of detail required in the content outline in the lessons. Second, there was a need to know the comparative rating of inductive and deductive lessons. Third, the research specialist was interested in the orientation of the teachers to the lab work which primarily involved the making of items versus the lessons that stressed cognitive learning.

Each of the three analyses to be discussed is based on a subset of the total set of data collected. Hence, the statistics presented are probably less stable than those given in previous portions of this paper. Thus, the results should be interpreted as "insights" rather than proven facts. The logical course of action following from these "insights" would be to replicate them with new materials or experimental settings.

In each of the analyses, lessons containing the two attributes of the variable in question were identified and the ratings for these lessons were compared. To control for the differences in teacher knowledge and experience associated with the various concepts, lessons exhibiting the two attributes of interest were selected within the same concept areas. In the comparison that follows, for example, lesson twenty-one in Unit II had a brief content outline. Since this lesson was based on the energy concept, the detailed lessons employed in the comparison were also from the energy area. A similar procedure was utilized in selecting the comparison lessons for the other outlined lessons. Lessons used in these analyses came from four different units; thus, the teachers' time or background in the course should be accounted for.

Outlined vs. Detailed Lessons. Development of detailed content presentations is a lengthy task and requires careful consideration of the characteristics of the students and teachers for which the materials are designed. Thus, it is important to assess the teachers' opinions and the students' terminal performance to determine the effectiveness of the two types of lessons. This study pertains only to the teachers' opinions.

When the general ratings of outlined and detailed lessons are summarized the following contingency table is obtained. The ratings are from item two in the lesson feedback form.

Rating (Item Two)

Lesson Type	a & b	d
Detailed	75	2
Outlined	28	5

Ratings a and b were combined since they indicate that the lessons were satisfactory. Choice d signifies a lack of information in the content outline.

Although the percentage of responses in the d category for the outlined lessons was relatively small, fifteen per cent, the Chi-square value for this table is significant beyond the .05 level ($.05 > P > .02$). This value indicates that the outlined lessons received significantly more d responses than the detailed lessons. A comment by one of the teachers after his rating corroborates this finding as he wrote: "This is another of those skimpy lessons. It hardly deserves rating." Based on these findings, the detailed lessons appear to meet with more favor from the teachers.

Deductive vs. Inductive Lessons. Lessons in the Level I guide were developed in inductive and deductive styles. There was some concern that the inductive lessons would not be favorably received by the teachers. However, a review of the ratings for both types of lessons revealed no significant differences. The response frequencies and percentages for item two in the lesson feedback form are given below.

Content Rating

Lesson Type	a	b	c	d	a & b
Deductive	46(85.2)	2(3.7)	1(1.9)	3(5.6)	2(3.7)
Inductive	65(78.3)	8(9.6)	2(2.4)	4(4.8)	4(4.8)

Notice that the comparative percentages in the parentheses vary only slightly.

Evidently both types of lessons were equally well received. However, more evidence needs to be gathered on the manner in which the inductive lessons were taught.

Knowledge and Skill vs. Production. Several lessons in the first level instructor's guide are centered on the production of a product with the basic objective being the creation of a specific number of items. The remaining lessons are concerned with the development of concepts. knowledges, and skills related to industry. For this analysis, the general ratings of the production lessons were compared with those of a sample of lessons whose primary intent was to develop concepts and knowledges. A resumé of the responses are presented below with the frequency listed first and the per cent given in the parenthesis.

		General Rating (Item Two)			
		a	b	c	d
Lesson Type	Production	20(52.6)	18(47.4)	0	0
	Concepts and Knowledges	7(10)	55(78.6)	5(7.1)	3(4.3)

The Komorgorov-Snirnov Two Sample Test gave a chi-square value that was significant beyond the .001 level. Category a, a rating of excellent, produced the largest divergence between the two types of lessons and was the basis for this significant difference. Obviously, the production lessons were more highly preferred.

This result gives an idea of the teachers' preference for making articles. A further indication of this preference is their comments on the feedback forms. For example, one teacher wrote "There was not enough time in the laboratory in this unit. I was surprised that the students did not complain." This bias will have to be considered when new or revised materials are produced. Also, it will be an important factor in the design of in-service training programs.

Summary

This paper has presented a broad and detailed view of the feedback system designed and utilized by the American Industry Project. Lists of all of the data generated by the system have been omitted. Instead, summaries of the unit and lesson data were reproduced and selected samples of data were given for special analyses.

In summary, the data substantiated the procedure used to determine the lesson and unit sequence. The decision to include the media narrative in the lessons was also verified. In addition, the detail and contents of the lessons were given a favorable rating. In fact, the complete set of lessons and units received a rating somewhat better than "good" on the feedback forms.

Written comments on the forms confirm the ratings. These comments also proved to be of value in isolating problems. And, in several instances, they provided acceptable solutions for the problems identified.

The value of the feedback system is apparent in the data and results presented in previous pages. Information is gathered upon which to base curriculum development decisions. Baseline data are generated for evaluating future innovations and changes. If used properly, the feedback system will provide information for most if not all of the decisions encompassed in curriculum development at the secondary level.

There were also some negative aspects associated with the system and the results. Failure to return the feedback sheets, especially the unit forms, created some problems. Specifically, lessons and units with a small number of ratings were difficult to evaluate. Fortunately, most lessons had an adequate number of responses. Another problem uncovered was the need to make better and more creative use of the laboratory.

A closing word of caution is appropriate at this point. The ratings on the feedback forms represent the opinions of the teachers. Thus, they must be interpreted in this light. The teacher, instructional materials, and students comprise an instructional system. Therefore, a low rating on the content outline of a lesson may lead to the decision to revise the lesson. However, a viable alternative decision would be to further develop the competencies of the teachers. The final choice will depend on the resources available and the overali objectives of the Project.

The basic purpose of the feedback system was to provide information for the decisions required in relation to the secondary curriculum development. In most instances, data from other sources will also be required to make these decisions. For instance, test results and responses to the End-of-Year Report will have an influence on these decisions. The nature of the decision determines the information required.

References

Bloom, B. S. (Ed.) Taxonomy of educational objectives: Handbook I: cognitive domain. New York: David McKay Company, Inc., 1956.

Burr, I. W., Engineering statistics and quality control. New York: McGraw-Hill Book Company, Inc., 1953.

Gebhart, R. H., Developing american industry courses for the secondary school. American Industry Project, Stout State University, Menomonie, Wisconsin, 1968.

Hays, W. L., Statistics for psychologists. New York: Holt, Rinehart and Winston, Inc. 1963.

Siegel, S., Nonparametric methods for the behavioral sciences. New York: McGraw-Hill, 1956.

Zuerlein, J., Modern curriculums demand new media and methodology. American Industry Project, Stout State University, Menomonie, Wisconsin, 1969.

Appendix F-A

LESSON ANALYSIS FORM

LESSON ANALYSIS FORM

Lesson Analysis For: Level ________ Unit ________ Lesson ________ Date ________ (Card 001)

Theme ____ (Card 002)

Lesson Analysis (003)

Concepts: Ball Ring Attributes (004)

Portion:	1	2	4	5	6	7	8	9	10	11	12	13	14	20	21	22	23	24	40	41	42	43	44	45	50	51	60	(005)
INTROD LO TAX LEV																												(006)
INTROD HI TAX LEV																												(007)
INTROD NO AT LO																												(008)
INTROD NO AT HI																												(009)
INTROD ACTIVITY																												(010)
INTROD IND PROB																												(011)
BLANK CARD																												(012)
BODY LO TAX LEV																												(013)
BODY HI TAX LEV																												(014)
BODY NO AT LO																												(015)
BODY NO AT HI																												(016)
BODY ACTIVITY																												(017)
BODY IND PROB																												(018)
BLANK CARD																												(019)
SUMMARY LO TAX																												(020)
SUMMARY HI TAX																												(021)
SUM NO AT LO																												(022)
SUM NO AT HI																												(023)
LESSON ACTIVITY																												(024)

LESSON ANALYSIS FORM

Interrelationships Matrix

(Card 025)

Concepts: Ball Ring Attributes (026)

Concepts - Attrib.	1	2	4	5	6	7	8	9	10	11	12	13	14	20	21	22	23	24	40	41	42	43	44	45	50	51	60	(027)
01 LOW TAX LEVEL																												(028)
01 HI TAX LEVEL																												(029)
01 NO AT LOW TAX																												(030)
01 NO AT HI TAX																												(031)
02 LOW TAX LEVEL																												(032)
02 HI TAX LEVEL																												(033)
02 NO AT LOW TAX																												(034)
02 NO AT HI TAX																												(035)
51 LOW TAX LEVEL																												(130)
51 HI TAX LEVEL																												(131)
51 NO AT LOW TAX																												(132)
51 NO AT HI TAX																												(133)
60 LOW TAX LEVEL																												(134)
60 HI TAX LEVEL																												(135)
60 NO AT LOW TAX																												(136)
60 NO AT HI TAX																												(137)

APPENDIX G

Evaluation of Student Booklets

by

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February, 1971

American Industry Project
USOE Contract No. OE-5-85-060
Co-Directors:
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Dr. Eugene R. F. Flug

At the conclusion of each unit in the Level I course, American Industry students rated the booklet used in the unit. The same rating instrument was utilized for all units. Twenty dimensions of concern to the curriculum specialist were placed in the Likert formate and reproduced in a form that could be optically scored. The items included in this instrument are reproduced in the summaries that follow.

Data were collected during the first two years the booklets were used. At the conclusion of the two years, it was decided for reasons of time, finances, and printing deadlines that the booklets would not be revised during the last year of the Project. Thus, the evaluation was discontinued.

Information on the validity and reliability of the instrument were collected during the initial year the instrument was used. At the end of the first year the booklets had been used, the research specialist examined a sample of the booklets for signs of use such as wear, smudges, and loose bindings. This information on useage was compared with the students' rating of the degree to which they read the booklets (item 18). Approximately 77% of the booklets assigned to the students who agreed or strongly agreed with the statement "I read most of this booklet" showed definite signs of wear. Since the "wear test" is not sensitive to all useage, it would appear that the students' ratings on this item reflect their utilization of the booklets. Since this item would appear to be the most sensitive statement in the instrument, there would appear to be no reason for not believing that the responses to the other items on the rating scale accurately reflect the perceived quality of the booklets.

Most of the items in the rating scale measure demensions that are independent of each other. However, item three, "If the booklet were harder it would be more interesting," and item seven, "This booklet was written for someone younger than me," overlapped. The correlation (Pearson r) between the responses to these two items was .80. Since these two items did not measure exactly the same dimension, the .80 correlation would appear to indicate that the students responded consistently.

The ensuing summaries are presented by grade level, year, and booklet. Also, a total summary that encompasses the ratings for all booklets is included for each year. As noted above, the data pertain to the first edition of the booklets. No revised editions were produced. The following comments will be based upon the two total summaries concluded from the packets of summary data for each year. The reader is invited to review the ratings for each booklet as given by specific grade levels. The number "10" in the summary table refers to grade 10 and above, in other words, grades 10, 11, and 12.

Four items give a direct indication of the quality of the student booklets. Item 1 in the rating scale asked the respondents to indicate how interesting the booklet was. In 1966-67, 59.2% thought that the booklets were interesting and 21.9% responded that they were not. Very similar results were found during the 1967-68 school year.

Students' perceptions of the amount they had learned from the booklets are revealed in the responses to items 9 and 10. During 1966-67, 58.7% of the responses indicated that the student had learned a considerable amount of information from the booklets and 24.7% indicated that he had not. The following year the students were more undecided with 50.1% agreeing that they had learned a lot and 21.7% disagreeing. Since this is a fairly strong statement, it would appear on the basis of students' perceptions that the booklets functioned effectively as far as learning was concerned.

Item 10 complements item 9 in that it asks the student to indicate his prior acquaintance with the contents of each booklet. In each year, approximately 21% thought they knew most of the contents of a booklet before they read it. This figure is almost identical to the percentages who felt that they did not learn a lot from the booklets. This analysis does not permit the determination of the number of students who knew most of the contents of all booklets.

During both school years, approximately 75% of the responses to item 12 concurred that the ideas in the booklets were worth knowing. Only slightly more than 8% disagreed with this statement. Obviously, the students thought that the material in the booklets was worth knowing.

In summary, the booklets were favorably received by the majority of the students. However, as will be discussed in the ensuing paragraphs, there is room for improvement.

As mentioned previously, the ratings refer to the first and only edition of the student booklets. Certain flaws have been indicated by the students' responses on the rating scale (NRS) and the participating teachers' comments. One basic problem centered on the names given to the characters in the booklets. The writer used the first names of the Project staff which resulted in the two boys being named Dick and Dan. These names caused the students to associate the booklets with their elementary school texts. Responses to item 7 reveal that about 36% of the readers felt that the booklets were written for someone younger. The simple act of changing names would enhance the booklets.

Another weakness of the booklets was the limited use of illustrations. The Project's printing process limited the type of illustration that could be included. This limitation is reflected in the students' responses to item 16. In 1966-67, 42.6% thought that the pictures helped to understand the booklet. During 1967-68, this dropped to 36.6%. It would appear that the booklets could be measureably improved with better illustrations.

Making these two revisions should improve the students' interest in the reading materials.

The reading level for each booklet is given in the table which follows the summaries of the students' ratings.

TABLE I

Combined NRS Ratings for All Student Booklets
in American Industry Level I: 1966-67

		SD	D	U	A	SA
1.	I thought this booklet was interesting	7.9	14.0	18.0	51.5	7.7
2.	I want to find out more about what was in this booklet	7.0	22.1	37.4	28.1	4.5
3.	If the booklet were harder it would be more interesting	18.9	34.3	20.7	20.7	6.6
4.	This booklet was too hard to read	53.9	33.0	5.3	3.3	2.5
5.	I knew most of the words in this booklet	3.2	9.5	12.6	47.3	25.9
6.	This booklet was about as easy to read as my other school books	9.8	17.9	12.6	39.8	20.2
7.	This booklet was written for someone younger than me	9.9	27.2	22.2	22.3	14.8
8.	Each idea in this booklet should be discussed more completely	6.6	25.7	33.9	24.6	8.0
9.	I learned a lot from this booklet	6.4	18.3	22.2	46.4	12.3
10.	I knew most of the things in this booklet before I read it	12.1	48.1	20.1	17.0	3.0
11.	This booklet answered questions I have been thinking about	8.4	22.7	32.1	32.5	5.5
12.	I think the ideas in this booklet are worth knowing	3.8	5.4	13.9	54.7	20.2
13.	I could understand what this booklet said after discussing it in class	4.3	11.0	18.6	48.1	16.4
14.	This booklet was easy to understand	3.3	7.6	13.6	49.1	24.3

		SD	D	U	A	SA
15.	This booklet was harder to understand than my other school books	37.2	43.5	11.7	5.1	1.3
16.	The pictures helped me understand this booklet	12.6	24.9	25.3	31.4	5.2
17.	The print in this booklet made it easy to read	1.8	5.3	12.2	49.5	30.3
18.	I read most of this booklet	7.6	15.2	9.3	48.7	18.4
19.	The definitions in the back of this booklet were helpful	3.5	6.6	18.4	45.1	25.7
20.	More of the words used in this booklet need to be defined	11.1	35.2	28.8	16.9	7.6

TABLE 3

Summary by Booklet

BOOK I – SUMMARY NRS: 1966-67

		Grade	SD	D	U	A	SA
1.	I thought this booklet was interesting	7	5.1	20.3	16.9	49.2	8.5
		8	11.8	8.8	22.1	39.7	9.3
		9	5.9	13.6	16.0	59.8	4.1
		10	10.1	17.9	20.8	48.8	2.4
2.	I want to find out more about what was in this booklet	7	5.9	25.4	34.7	30.5	3.4
		8	5.4	19.6	30.9	21.6	8.3
		9	8.0	22.0	39.6	29.6	1.2
		10	8.8	23.7	42.5	21.3	3.9

		Grade	SD	D	U	A	SA
3.	*If the booklet were harder it would be more interesting*	7	41.0	31.4	13.0	9.3	5.9
		8	17.6	29.9	16.7	22.5	2.9
		9	16.6	45.6	17.8	14.2	5.9
		10	18.8	31.4	16.4	24.6	8.2
4.	*This booklet was too hard to read*	7	59.3	27.1	5.1	4.2	3.4
		8	54.4	26.5	2.9	2.9	11.3
		9	62.1	33.7	1.8	1.8	.6
		10	65.2	29.0	2.9	.5	1.4
5.	*I knew most of the words in this booklet*	7	3.4	2.5	9.3	49.2	33.9
		8	4.4	8.3	9.8	37.7	31.4
		9	2.4	10.7	10.1	49.1	27.8
		10	1.4	5.8	9.2	50.2	31.9
6.	*This booklet was about as easy to read as my other school books*	7	3.4	10.2	9.3	44.9	32.2
		8	13.2	15.7	16.2	31.3	21.1
		9	8.3	21.3	8.3	40.8	21.3
		10	12.6	21.7	9.2	36.7	19.3
7.	*This booklet was written for someone younger than me*	7	16.1	28.0	23.7	18.6	13.6
		8	15.2	17.2	25.0	17.2	15.7
		9	10.7	31.4	21.9	20.1	15.4
		10	4.8	13.0	24.2	32.9	24.6
8.	*Each idea in this booklet should be discussed more completely*	7	11.9	25.4	21.2	26.3	13.6
		8	7.8	22.1	26.0	27.0	7.4
		9	8.3	29.0	32.5	24.9	4.1
		10	6.8	22.7	35.3	22.2	11.1

	Grade	SD	D	U	A	SA
9. *I learned a lot from this booklet*	7	4.2	13.6	14.4	45.8	19.5
	8	9.8	11.2	14.7	46.1	9.8
	9	4.7	8.0	15.4	53.8	17.8
	10	8.2	13.0	22.7	45.9	8.2
10. *I knew most of the things in this booklet before I read it*	7	30.5	27.1	23.7	11.9	5.1
	8	22.1	36.3	19.6	10.3	4.4
	9	14.2	49.1	20.7	14.2	1.8
	10	10.6	47.3	17.9	18.4	4.3
11. *This booklet answered questions I have been thinking about*	7	14.4	23.7	26.3	23.7	10.2
	8	8.8	18.6	25.0	29.9	10.3
	9	8.3	26.6	30.8	30.8	3.6
	10	8.2	27.5	34.3	25.1	3.9
12. *I think the ideas in this booklet are worth knowing*	7	5.1	8.5	17.8	39.8	25.4
	8	6.9	3.9	16.2	45.6	19.1
	9	2.4	4.1	10.7	58.0	23.7
	10	2.4	4.8	13.5	59.9	18.8
13. *I could understand what this booklet said after discussing it in class*	7	3.4	13.0	16.1	45.8	21.2
	8	4.4	12.3	13.2	43.1	19.1
	9	3.0	8.9	18.3	56.2	13.6
	10	3.4	6.3	16.4	58.9	13.5
14. *This booklet was easy to understand*	7	4.2	13.0	21.2	38.1	22.0
	8	7.4	9.8	7.8	42.6	22.5
	9	.6	5.3	22.5	44.4	26.6
	10	3.4	6.8	10.1	47.8	28.5

	Grade	SD	D	U	A	SA
15. This booklet was harder to understand than my other school books	7	39.0	33.1	13.0	9.3	5.1
	8	37.8	31.9	12.7	3.4	12.3
	9	42.0	42.0	10.7	3.0	1.8
	10	49.3	34.3	7.2	4.8	2.9
16. The pictures helped me understand this booklet	7	13.6	17.8	22.9	36.4	8.5
	8	18.6	15.2	24.0	29.4	8.8
	9	16.0	29.6	18.9	30.8	4.7
	10	13.0	27.1	27.5	26.1	5.8
17. The print in this booklet made it easy to read	7	2.5	9.3	15.3	42.4	30.5
	8	4.4	4.4	16.2	49.0	17.2
	9	3.0	3.6	9.5	58.0	26.0
	10	2.4	3.9	4.8	52.6	35.7
18. I read most of this booklet	7	3.4	11.9	6.8	39.8	38.1
	8	7.4	15.2	7.4	33.3	27.0
	9	1.8	5.9	5.3	46.7	40.2
	10	5.8	6.8	4.8	50.7	30.4
19. The definitions in the back of this booklet were helpful	7	5.1	10.2	16.1	39.0	28.0
	8	6.4	4.4	16.2	38.7	25.5
	9	.6	5.9	13.0	43.8	36.7
	10	3.9	4.3	15.5	44.9	30.4
20. More of the words used in this booklet need to be defined	7	13.6	28.8	16.9	23.7	16.9
	8	13.2	24.0	27.0	18.6	15.2
	9	11.8	34.3	30.8	17.1	5.9
	10	15.5	32.4	30.0	12.0	9.7

BOOK 2 – SUMMARY NRS: 1966 67

	Grade	SD	D	U	A	SA
1. I thought this booklet was interesting	7	6.0	11.1	12.0	49.6	20.5
	8	---	5.8	15.9	52.2	24.6
	9	1.9	8.4	15.3	64.9	9.2
	10	18.5	33.3	14.8	33.3	---
2. I want to find out more about what was in this booklet	7	6.8	19.7	29.9	27.4	16.2
	8	4.3	20.3	40.6	26.1	7.2
	9	3.4	21.4	45.0	26.7	3.1
	10	22.2	37.0	25.9	11.1	3.7
3. If the booklet were harder it would be more interesting	7	15.4	41.9	24.8	11.1	6.0
	8	13.0	23.2	30.4	23.2	8.7
	9	18.3	47.3	21.0	9.2	3.8
	10	18.5	29.6	14.8	25.9	11.1
4. This booklet was too hard to read	7	49.6	38.5	4.3	3.4	2.6
	8	69.6	20.3	2.9	5.8	---
	9	51.9	41.2	4.6	1.5	.8
	10	48.1	33.3	3.7	7.4	7.4
5. I knew most of the words in this booklet	7	3.4	10.3	22.2	43.6	19.7
	8	2.9	17.4	11.6	52.2	14.5
	9	1.5	8.4	15.6	53.1	21.4
	10	3.7	3.7	7.4	44.4	40.7
6. This booklet was about as easy to read as my other school books	7	6.0	13.7	12.8	42.7	23.9
	8	2.9	15.9	13.0	47.8	20.3
	9	5.7	---	12.6	48.5	15.3
	10	14.8	14.8	18.5	25.9	25.9

	Grade	SD	D	U	A	SA
7. This booklet was written for someone younger than me	7	11.1	34.2	24.8	19.7	8.5
	8	10.1	33.3	29.0	20.3	4.3
	9	13.0	37.8	29.8	12.6	6.1
	10	14.8	18.5	18.5	25.9	18.5
8. Each idea in this booklet should be discussed more completely	7	8.5	19.7	29.1	29.1	12.8
	8	8.7	36.2	23.2	23.2	7.2
	9	3.8	26.0	41.2	21.0	7.3
	10	7.4	33.3	29.6	14.8	14.8
9. I learned a lot from this booklet	7	2.6	11.1	19.7	17.9	17.9
	8	1.4	13.0	20.3	39.1	23.2
	9	2.7	9.5	16.4	60.7	9.2
	19	18.5	18.5	37.0	22.2	3.7
10. I knew most of the things in this booklet before I read it	7	17.1	44.4	17.9	17.9	2.6
	8	18.8	47.8	18.8	11.6	1.1
	9	9.5	47.7	25.2	13.4	1.5
	10	18.5	14.8	29.6	18.5	18.5
11. This booklet answered questions I have been thinking about	7	11.1	24.8	25.6	31.6	6.8
	8	8.7	20.3	23.2	42.0	1.3
	9	5.0	24.4	24.0	39.3	6.5
	10	22.2	18.5	40.7	18.5	
12. I think the ideas in this booklet are worth knowing	7	2.6	12.0	14.5	44.1	25.6
	8	---	---	15.9	49.3	31.9
	9	.8	4.2	6.9	63.7	23.3
	10	18.5	14.8	18.5	40.7	

	Grade	SD	D	U	A	SA
13. I could understand what this booklet said after discussing it in class	7	3.4	10.3	23.9	13.6	17.1
	8	2.9	15.9	8.7	49.3	21.7
	9	3.8	10.3	20.2	48.1	16.8
	10	11.1	18.5	25.9	37.0	7.4
14. This booklet was easy to understand	7	1.7	12.8	16.2	43.6	24.8
	8	---	11.6	20.3	50.7	14.5
	9	1.5	7.3	13.4	54.2	22.9
	10	3.7	11.1	11.1	44.4	29.6
15. This booklet was harder to understand than my other school books	7	31.6	40.2	17.9	8.5	.9
	8	40.6	36.2	11.6	10.1	---
	9	34.7	49.2	9.9	1.5	3.8
	10	37.0	25.9	18.5	7.4	11.1
16. The pictures helped me understand this booklet	7	10.3	19.7	23.1	37.6	9.4
	8	5.8	15.9	29.0	37.7	10.1
	9	6.5	15.3	26.3	45.0	6.9
	10	22.2	25.9	29.6	18.5	3.7
17. The print in this booklet made it easy to read	7	5.1	8.5	17.9	44.4	21.4
	8	---	---	8.7	63.7	24.6
	9	.4	3.1	7.6	59.9	26.7
	10	7.4	3.7	11.1	33.3	44.4
18. I read most of this booklet	7	5.1	11.1	8.5	41.0	32.5
	8	2.9	5.8	2.9	59.4	27.5
	9	3.1	8.0	5.3	55.3	27.1
	10	18.5	11.1		37.0	29.6

	Grade	SD	D	U	A	SA
19. The definitions in the back of this booklet were helpful	7	4.3	5.1	16.2	43.6	29.9
	8	---	---	23.3	50.7	24.6
	9	.8	5.0	7.6	51.5	34.4
	10	11.1	11.1	18.5	44.4	14.8
20. More of the words used in this booklet need to be defined	7	13.7	20.5	26.5	21.4	17.1
	8	5.8	26.1	31.9	17.4	17.4
	9	4.2	34.0	33.6	21.8	6.1
	10	25.9	25.9	7.4	22.2	18.5

BOOK 3 – SUMMARY NRS: 1966-67

	Grade	SD	D	U	A	SA
1. I thought this booklet was interesting	7	10.2	44.9	10.2	34.7	---
	8	11.8	17.5	15.0	50.0	5.0
	9	5.9	15.0	15.7	57.5	5.2
	10	13.3	21.0	25.7	37.1	2.9
2. I want to find out more about what was in this booklet	7	10.2	38.8	32.7	14.3	4.1
	8	7.5	25.0	40.0	22.5	5.0
	9	7.8	22.9	44.4	21.6	3.3
	10	8.6	25.7	40.0	22.9	2.9
3. If the booklet were harder it would be more interesting	7	46.9	22.4	18.4	10.2	2.0
	8	12.5	25.0	25.0	23.3	14.2
	9	15.7	40.5	23.5	14.4	5.9
	10	10.5	34.3	15.2	29.5	10.5

	Grade	SD	D	U	A	SA
4. *This booklet was too hard to read*	7	46.9	38.8	10.2	2.0	2.0
	8	66.7	27.5	3.3	1.7	.8
	9	54.9	37.3	4.6	1.3	1.3
	10	59.0	29.5	3.8	2.9	3.8
5. *I knew most of the words in this booklet*	7	2.0	10.2	14.3	55.1	18.4
	8	3.3	10.8	8.3	41.7	35.8
	9	1.3	10.5	10.5	49.7	26.8
	10	4.8	1.9	5.7	49.5	38.1
6. *This booklet was about as easy to read as my other school books*	7	2.0	14.3	14.3	49.0	20.4
	8	14.2	20.8	15.0	31.7	18.3
	9	7.8	19.0	12.4	41.2	19.6
	10	13.3	26.7	6.7	32.4	21.0
7. *This booklet was written for someone younger than me*	7	12.2	51.0	18.4	12.2	6.1
	8	9.2	25.0	25.0	16.7	23.3
	9	6.5	31.4	22.9	22.9	15.0
	10	4.8	15.2	24.8	31.4	22.9
8. *Each idea in this booklet should be discussed more completely*	7	8.2	18.4	20.4	34.7	18.4
	8	3.3	35.0	28.3	21.7	11.7
	9	5.2	32.0	36.6	22.2	3.9
	10	3.8	24.8	32.4	32.4	6.7
9. *I learned a lot from this booklet*	7	10.2	20.4	22.4	34.7	10.2
	8	5.0	7.5	27.5	51.7	8.3
	9	6.5	10.5	19.6	51.6	9.2
	10	13.3	10.5	35.2	35.2	5.7

	Grade	SD	D	U	A	SA
10. I knew most of the things in this booklet before I read it	7	20.4	40.8	22.4	10.2	2.0
	8	15.8	45.8	20.8	12.5	4.2
	9	5.9	49.0	23.5	15.7	5.2
	10	8.6	41.0	23.8	20.0	5.7
11. This booklet answered questions I have been thinking about	7	10.2	30.6	24.5	28.6	4.1
	8	9.2	29.2	25.0	32.5	4.2
	9	6.5	22.9	31.4	35.3	3.9
	10	8.6	17.1	43.8	25.7	4.8
12. I think the ideas in this booklet are worth knowing	7	4.1	12.2	28.6	36.7	16.3
	8	5.0	2.5	12.5	54.2	25.8
	9	3.3	5.2	9.8	57.5	22.9
	10	9.5	3.8	11.4	61.0	14.3
13. I could understand what this booklet said after discussing it in class	7	4.1	14.3	22.4	44.9	14.3
	8	2.5	8.3	15.8	41.7	31.7
	9	2.0	8.5	18.3	49.7	19.6
	10	4.8	14.3	23.8	41.0	16.2
14. This booklet was easy to understand	7	6.1	18.4	20.4	40.8	8.2
	8	.8	1.7	13.3	53.3	30.0
	9	.7	7.8	15.0	51.0	24.8
	10	4.8	4.8	6.7	56.2	26.7
15. This booklet was harder to understand than my other school books	7	32.7	32.7	20.4	8.2	6.1
	8	52.5	36.7	4.2	5.8	.8
	9	41.2	46.4	6.5	4.6	1.3
	10	48.6	37.1	3.8	6.7	2.9

	Grade	SD	D	U	A	SA
16. *The pictures helped me understand this booklet*	7	16.3	12.2	16.3	34.7	20.4
	8	10.8	27.5	26.7	26.7	8.3
	9	8.5	21.6	24.2	39.2	6.5
	10	10.5	16.2	33.3	29.5	10.5
17. *The print in this booklet made it easy to read*	7	2.0	10.2	10.2	49.0	28.6
	8	6.7	---	7.5	44.2	41.7
	9	2.6	2.6	3.9	60.8	30.1
	10	1.9	2.9	7.6	51.4	35.2
18. *I read most of this booklet*	7	---	10.2	12.2	51.0	26.5
	8	5.8	11.7	10.8	40.8	29.2
	9	4.6	6.5	5.9	56.9	26.1
	10	10.5	10.5	4.8	48.6	25.7
19. *The definitions in the back of this booklet were helpful*	7	4.1	4.1	10.2	34.7	46.9
	8	3.3	3.3	13.3	41.7	37.5
	9	2.6	2.6	12.4	47.1	34.6
	10	3.8	5.7	22.9	44.8	22.9
20. *More of the words used in this booklet need to be defined*	7	12.2	16.3	30.6	22.4	18.4
	8	16.7	35.8	21.7	16.7	9.2
	9	11.1	34.6	31.4	16.3	6.5
	10	10.5	37.1	23.8	19.0	9.5

BOOK 4 – SUMMARY NRS: 1966-67

	Grade	SD	D	U	A	SA
1. I thought this booklet was interesting	7	25.0	25.0	12.5	31.2	6.3
	8	10.0	20.0	20.0	43.6	6.4
	9	6.5	11.3	17.7	52.4	12.1
	10	16.5	12.4	27.8	40.2	3.1
2. I want to find out more about what was in this booklet	7	18.8	31.2	18.8	25.0	6.3
	8	6.4	22.7	44.5	20.9	4.5
	9	4.8	16.1	33.9	40.3	4.0
	10	11.3	24.7	30.9	28.9	4.1
3. If the booklet were harder it would be more interesting	7	50.0	25.0	6.3	12.5	6.3
	8	29.1	30.0	12.7	20.0	8.9
	9	14.5	34.7	21.8	17.7	11.3
	10	15.5	28.9	19.6	30.0	6.2
4. This book was too hard to read	7	31.2	37.5	6.3	18.8	6.3
	8	48.2	40.0	5.5	4.5	1.8
	9	61.3	32.3	1.6	3.2	1.6
	10	47.4	36.1	7.2	4.1	2.1
5. I knew most of the words in this booklet	7	18.8	31.2	12.5	18.8	18.8
	8	7.3	11.8	10.0	39.1	31.8
	9	3.2	10.5	8.1	50.8	27.4
	10	5.2	7.2	9.3	50.5	27.8
6. This booklet was about as easy to read as my other school books	7	6.3	43.8	6.3	25.0	18.8
	8	12.7	10.9	13.6	41.8	20.0
	9	8.9	16.9	12.9	31.5	28.2
	10	12.4	27.8	12.4	33.0	13.4

	Grade	SD	D	U	A	SA
7. This booklet was written for someone younger than me	7	12.5	43.8	25.0	6.3	12.5
	8	16.4	30.9	26.4	14.5	11.8
	9	8.1	23.4	24.2	26.6	16.9
	10	7.2	14.4	23.7	30.0	23.7
8. Each idea in this booklet should be discussed more completely	7	6.3	12.5	31.2	37.5	12.5
	8	10.9	24.5	30.9	20.9	12.7
	9	7.3	29.0	32.3	25.0	6.5
	10	3.1	30.0	33.0	19.6	14.4
9. I learned a lot from this booklet	7	18.8	37.5	18.8	18.8	6.3
	8	6.4	16.4	23.6	41.8	11.8
	9	4.8	9.7	21.8	49.2	13.7
	10	12.4	14.4	21.6	46.4	4.1
10. I knew most of the things in this booklet before I read it	7	25.0	43.8	18.8	6.3	6.3
	8	16.4	42.7	17.3	14.5	8.2
	9	8.9	55.6	18.5	11.3	4.8
	10	11.3	36.1	23.7	25.8	3.1
11. This booklet answered questions I have been thinking about	7	31.2	31.2	12.5	18.8	6.3
	8	9.1	21.8	34.5	29.1	5.5
	9	5.6	21.8	29.8	37.9	4.0
	10	8.2	23.7	30.9	32.0	5.2
12. I think the ideas in this booklet are worth knowing	7	25.0	12.5	31.2	18.8	12.5
	8	3.6	4.5	16.4	49.1	24.5
	9	.8	4.0	12.9	57.3	25.0
	10	8.2	5.2	15.5	60.8	10.3

	Grade	SD	D	U	A	SA
13. I could understand what this booklet said after discussing it in class	7	6.3	18.8	—	56.3	---
	8	4.5	9.1	19.1	50.9	16.4
	9	4.8	10.5	8.6	52.4	23.4
	10	6.2	18.6	15.5	45.4	13.4
14. This booklet was easy to understand	7	31.2	12.5	---	18.8	25.0
	8	6.4	8.9	12.7	43.6	29.1
	9	2.4	4.8	10.5	54.8	26.6
	10	3.1	4.1	7.2	57.7	27.8
15. This booklet was harder to understand than my other school books	7	37.5	25.0	12.5	12.5	---
	8	42.7	35.5	9.1	7.3	5.5
	9	43.5	46.0	5.6	4.0	---
	10	42.3	41.2	7.2	4.1	4.1
16. The pictures helped me understand this booklet	7	25.0	12.5	25.0	25.0	12.5
	8	7.3	28.2	22.7	28.2	13.6
	9	9.7	22.6	29.8	30.6	6.5
	10	10.3	16.5	25.8	39.2	8.2
17. The print in this booklet made it easy to read	7	25.0	6.3	25.0	25.0	18.8
	8	4.5	1.8	9.1	53.6	30.9
	9	3.2	4.0	6.5	57.3	29.0
	10	6.2	2.1	9.3	47.4	35.1
18. I read most of this booklet	7	12.5	12.5	6.3	50.0	18.8
	8	4.5	10.0	4.5	51.8	28.2
	9	4.0	8.9	7.3	53.2	26.6
	10	9.3	8.2	10.3	48.5	23.7

	Grade	SD	D	U	A	SA
19. *The definitions in the back of this booklet were helpful*	7	18.8	18.8	25.0	25.0	12.5
	8	4.5	3.6	8.9	37.3	46.4
	9	---	2.4	12.1	47.6	37.9
	10	3.1	10.3	14.4	39.2	33.0
20. *More of the words used in this booklet need to be defined*	7	---	18.8	25.0	25.0	31.2
	8	13.6	25.5	21.8	22.7	16.4
	9	8.9	38.7	21.8	20.2	10.5
	10	10.3	26.8	26.8	14.4	21.6

BOOK 5 – SUMMARY NRS: 1966-67

	Grade	SD	D	U	A	SA
1. *I thought this booklet was interesting*	8	6.5	13.0	19.4	52.8	8.3
	9	3.8	9.9	13.0	66.4	6.9
	10	13.4	17.9	18.8	47.3	2.7
2. *I want to find out more about what was in this booklet*	8	10.2	30.6	29.6	27.8	1.9
	9	4.6	19.1	34.4	40.5	1.5
	10	8.9	21.4	37.5	30.4	1.8
3. *If the booklet were harder it would be more interesting*	8	20.4	30.6	25.0	19.4	4.6
	9	10.7	28.2	29.8	22.1	9.2
	10	11.6	30.4	24.1	28.6	4.5
4. *This booklet was too hard to read*	8	58.3	25.9	13.9	1.9	---
	9	48.1	42.7	5.3	1.5	1.5
	10	49.1	34.8	8.0	6.3	1.8

	Grade	SD	D	U	A	SA
5. I knew most of the words in this booklet	8	1.9	15.7	14.8	38.0	29.6
	9	3.8	13.7	15.3	49.6	17.6
	10	4.5	6.3	23.2	40.2	24.1
6. This booklet was about as easy to read as my other school books	8	9.3	15.7	13.9	44.4	16.7
	9	9.2	20.6	13.7	38.9	16.8
	10	13.4	18.8	17.9	37.5	12.5
7. This booklet was written for someone younger than me	8	13.0	31.5	21.3	21.3	10.2
	9	6.9	32.1	24.4	21.4	13.7
	10	4.5	17.0	24.1	27.7	26.8
8. Each idea in this booklet should be discussed more completely	8	2.8	33.3	48.1	13.0	2.8
	9	6.1	22.1	35.9	31.3	4.6
	10	8.9	19.6	35.7	25.9	8.9
9. I learned a lot from this booklet	8	3.7	18.5	24.1	42.6	11.1
	9	3.1	7.6	20.6	54.2	13.7
	10	14.3	13.4	31.3	33.9	5.4
10. I knew most of the things in this booklet before I read it	8	10.2	51.9	23.1	13.0	1.9
	9	13.0	39.7	22.1	21.4	3.1
	10	8.9	41.1	23.2	23.2	3.6
11. This booklet answered questions I have been thinking about	8	10.2	17.6	31.5	35.2	4.6
	9	3.8	20.6	31.3	38.9	5.3
	10	10.7	19.6	42.0	24.1	3.6
12. I think the ideas in this booklet are worth knowing	8	3.7	7.4	12.0	57.4	19.4
	9	1.5	3.1	13.7	61.8	19.1
	10	8.9	5.4	22.3	49.1	13.4

	Grade	SD	D	U	A	SA
13. I could understand what this booklet said after discussing it in class	8	2.8	15.7	15.7	49.1	16.7
	9	3.8	6.1	22.9	53.4	13.7
	10	12.5	15.2	19.6	46.4	6.3
14. This booklet was easy to understand	8	1.9	12.0	16.7	47.2	20.4
	9	2.3	6.9	10.7	52.7	27.5
	10	6.3	6.3	17.0	52.7	15.2
15. This booklet was harder to understand than my other school books	8	35.2	37.0	7.4	11.1	3.7
	9	35.9	42.0	11.5	6.1	1.5
	10	41.1	42.0	11.6	5.4	---
16. The pictures helped me understand this booklet	8	9.3	9.3	34.3	37.0	10.2
	9	4.6	16.8	29.8	22.0	6.9
	10	8.9	14.3	30.4	25.9	19.6
17. The print in this booklet made it easy to read	8	2.8	5.6	9.3	55.6	26.9
	9	.8	6.1	9.9	56.5	26.0
	10	5.4	4.5	17.9	43.8	28.6
18. I read most of this booklet	8	4.6	13.0	16.7	48.1	16.7
	9	2.3	11.5	9.9	56.5	19.8
	10	9.8	8.9	15.2	53.6	10.7
19. The definitions in the back of this booklet were helpful	8	4.6	.9	14.8	35.2	44.4
	9	2.3	16.1	13.7	52.7	24.4
	10	5.4	9.8	8.9	47.3	28.6
20. More of the words used in this booklet need to be defined	8	8.3	31.5	29.6	20.4	10.2
	9	5.3	32.8	30.5	22.9	8.4
	10	10.7	17.9	31.3	19.6	19.6

BOOK 6 — SUMMARY NRS: 1966-67

	Grade	SD	D	U	A	SA
1. I thought this booklet was interesting	8	5.5	8.8	21.1	54.4	9.9
	9	5.1	8.9	13.9	58.2	13.9
	10	18.5	12.3	15.4	47.7	6.2
2. I want to find out more about what was in this booklet	8	7.7	21.1	38.9	30.0	2.2
	9	3.8	15.2	30.4	40.5	10.1
	10	13.8	18.5	32.3	27.7	6.2
3. If the booklet were harder it would be more interesting	8	12.2	41.1	20.0	18.9	7.7
	9	7.6	30.4	27.8	27.8	6.3
	10	16.9	18.5	29.2	24.6	10.8
4. This booklet was too hard to read	8	51.1	28.9	10.0	6.6	3.3
	9	45.6	43.0	7.6	3.8	---
	10	50.8	33.8	10.8	1.5	3.1
5. I knew most of the words in this booklet	8	4.4	13.3	13.3	43.3	23.3
	9	---	3.8	20.3	59.5	16.5
	10	7.7	4.6	15.4	46.2	26.2
6. This booklet was about as easy to read as my other school books	8	10.0	8.8	13.3	40.0	27.8
	9	7.6	16.5	16.5	45.6	12.7
	10	10.8	13.8	20.0	32.3	23.1
7. This booklet was written for someone younger than me	8	8.8	37.8	20.0	21.1	12.2
	9	3.8	22.8	24.1	38.0	11.4
	10	6.2	13.8	30.8	21.5	26.2

	Grade	SD	D	U	A	SA
8. *Each idea in this booklet should be discussed more completely*	8	4.4	30.0	35.6	22.2	6.6
	9	5.1	25.3	34.2	30.4	5.1
	10	10.8	18.5	40.0	23.1	7.7
9. *I learned a lot from this booklet*	8	3.3	10.0	34.4	44.4	7.7
	9	3.8	15.2	21.5	46.8	12.7
	10	10.8	12.3	27.7	41.5	7.7
10. *I knew most of the things in this booklet before I read it*	8	8.8	46.7	26.7	13.3	4.4
	9	2.5	41.8	27.8	24.1	2.5
	10	10.8	35.4	29.2	16.9	6.2
11. *This booklet answered questions I have been thinking about*	8	7.7	27.8	28.9	28.9	4.4
	9	3.8	13.9	40.5	34.2	7.6
	10	10.8	20.0	36.9	30.8	1.5
12. *I think the ideas in this booklet are worth knowing*	8	1.1	5.5	16.7	51.1	23.3
	9	2.5	5.1	19.0	54.4	19.0
	10	7.7	6.2	23.1	47.7	15.4
13. *I could understand what this booklet said after discussing it in class*	8	4.4	7.7	26.7	42.2	16.7
	9	1.3	19.0	30.4	46.8	2.5
	10	9.2	4.6	27.7	43.1	15.4
14. *This booklet was easy to understand*	8	3.3	4.4	17.8	47.8	25.6
	9	1.3	5.1	10.1	59.5	22.8
	10	7.7	7.7	12.3	47.7	23.1
15. *This booklet was harder to understand than my other school books*	8	42.2	38.9	10.0	6.6	1.1
	9	39.2	11.8	12.7	3.8	1.3
	10	43.1	32.3	13.8	6.2	4.6

	Grade	SD	D	U	A	SA
16. *The pictures helped me understand this booklet*	8	8.8	17.8	30.0	32.2	9.9
	9	6.3	17.7	27.8	39.2	7.6
	10	20.0	12.3	27.7	30.8	9.2
17. *The print in this booklet made it easy to read*	8	4.4	7.7	11.1	45.6	28.9
	9	2.5	11.4	13.9	51.9	19.0
	10	7.7	4.6	9.2	46.2	32.3
18. *I read most of this booklet*	8	10.0	16.7	7.7	36.7	26.7
	9	6.3	8.9	7.6	49.4	26.6
	10	13.8	7.7	12.3	49.2	16.9
19. *The definitions in the back of this booklet were helpful*	8	4.4	7.7	12.2	33.3	41.1
	9	5.1	7.6	17.7	44.3	24.1
	10	13.8	6.2	15.4	33.8	30.8
20. *More of the words used in this booklet need to be defined*	8	10.0	25.6	32.2	22.2	8.8
	9	12.7	29.1	31.6	16.5	7.6
	10	10.8	21.5	38.5	15.4	13.8

BOOK 7 - SUMMARY NRS: 1966-7

	Grade	SD	D	U	A	SA
1. *I thought this booklets was interesting*	8	4.7	13.4	26.8	46.3	8.1
	9	1.8	7.3	10.0	70.0	10.9
	10	8.7	17.4	17.4	56.5	------

	Grade	SD	D	U	A	SA
2. *I want to find out more about what was in this booklet*	8	6.7	22.1	34.9	30.9	5.4
	9	.9	10.9	44.5	40.0	3.6
	10	8.7	30.4	37.0	23.9	------
3. *If the booklet were harder it would be more interesting*	8	18.8	38.9	18.1	18.1	4.7
	9	12.7	35.5	21.8	24.5	4.5
	10	4.3	34.8	19.6	39.1	2.2
4. *This booklet was too hard to read*	8	46.3	37.6	6.7	6.0	3.4
	9	38.2	48.2	7.3	3.6	2.7
	10	37.0	50.0	6.5	4.3	2.2
5. *I knew most of the words in this booklet*	8	3.4	14.8	10.7	48.3	22.1
	9	1.8	13.6	19.1	54.5	10.9
	10	2.2	4.3	13.0	63.0	17.4
6. *This booklet was about as easy to read as my other school books*	8	8.1	10.7	11.4	47.7	22.1
	9	5.5	26.4	9.1	43.6	15.5
	10	10.9	19.6	13.0	39.1	17.4
7. *This booklet was written for someone younger than me*	8	14.1	30.9	24.8	21.5	8.1
	9	10.9	35.5	22.7	23.6	7.3
	10	2.2	26.1	10.9	43.5	17.4
8. *Each idea in this booklet should be discussed more completely*	8	6.7	26.8	34.9	26.2	4.0
	9	3.6	18.2	46.4	26.4	4.5
	10	10.9	13.0	41.3	30.4	4.3

	Grade	SD	D	U	A	SA
9. I learned a lot from this booklet	8	5.4	12.8	26.8	43.6	10.1
	9	1.8	12.7	23.6	48.2	12.7
	10	10.9	15.2	28.3	41.3	4.3
10. I knew most of the things in this booklet before I read it	8	12.1	43.0	20.1	18.1	5.4
	9	13.6	34.5	23.6	23.6	4.5
	10	13.0	30.4	26.1	28.3	2.2
11. This booklet answered questions I have been thinking about	8	6.7	27.5	30.2	30.2	5.4
	9	5.5	14.5	32.7	38.2	8.2
	10	10.9	19.6	37.0	28.3	4.3
12. I think the ideas in this booklet are worth knowing	8	2.0	8.7	13.4	60.4	14.8
	9	——	1.8	15.5	60.9	20.0
	10	4.3	.87	19.6	63.0	4.3
13. I could understand what this booklet said after discussing it in class	8	3.4	9.4	19.5	47.7	19.5
	9	5.5	9.1	27.3	45.5	10.9
	10	4.3	17.4	19.6	45.7	13.0
14. This booklet was easy to understand	8	4.0	7.4	12.8	53.7	21.5
	9	.9	7.3	12.7	43.6	30.0
	10	4.3	8.7	19.6	52.2	15.2
15. This booklet was harder to understand than my other school books	8	41.6	32.2	15.4	8.7	2.0
	9	37.3	37.3	11.8	4.5	2.7
	10	34.8	50.0	4.3	6.5	2.2

	Grade	SD	D	U	S	SA
16. *The pictures helped me understand this booklet*	8	10.1	23.5	23.5	36.9	5.4
	9	5.5	12.7	36.4	36.4	8.2
	10	10.9	15.2	30.4	34.8	8.7
17. *The print in this booklet made it easy to read*	8	2.0	11.4	5.4	53.0	27.5
	9	.9	7.3	5.5	53.6	30.9
	10	------	2.2	13.0	54.3	30.4
18. *I read most of this booklet*	8	10.1	7.4	8.7	42.3	30.2
	9	4.5	14.5	15.5	45.5	19.1
	10	8.7	8.7	8.7	58.7	15.2
19. *The definitions in the back of this booklet were helpful*	8	3.4	7.4	16.8	38.3	34.2
	9	------	1.8	15.5	58.2	23.6
	10	4.3	4.3	4.3	58.7	26.1
20. *More of the words used in this booklet need to be defined*	8	10.1	20.8	32.2	20.8	15.4
	9	6.4	29.1	31.8	23.6	8.2
	10	4.3	37.0	23.9	19.6	15.2

TABLE 4

Combined NRS Ratings for All Student Booklets in American Industry Level I: 1967-68

		SD	D	U	A	SA
1.	I thought this booklet was interesting	5.7	15.0	20.3	51.8	7.0
2.	I want to find out more about what was in this booklet	7.0	27.3	35.7	25.7	4.0
3.	If the booklet were harder it would be more interesting	17.0	41.3	19.5	16.4	5.3
4.	This booklet was too hard to read	49.1	37.9	7.1	3.1	2.3
5.	I knew most of the words in this booklet	2.9	9.6	11.8	46.6	28.8
6.	This booklet was about as easy to read as my other school books	8.3	22.4	12.3	37.2	19.3
7.	This booklet was written for someone younger than me	8.2	31.9	25.0	22.4	11.5
8.	Each idea in this booklet should be discussed more completely	8.2	27.7	33.5	21.9	8.0
9.	I learned a lot from this booklet	6.5	15.2	27.0	40.4	9.7
10.	I knew most of the things in this booklet before I read it	9.4	44.4	24.1	17.8	3.5
11.	This booklet answered questions I have been thinking about	6.8	28.7	27.9	31.9	3.9
12.	I think the ideas in this booklet are worth knowing	2.6	5.6	15.0	59.9	16.5
13.	I could understand what this booklet said after discussing it in class	3.8	11.2	20.0	50.6	13.4

	SD	D	U	A	SA
14. This booklet was easy to understand	1.4	8.8	15.4	47.6	25.7
15. This booklet was harder to understand than my other school books	40.5	39.2	12.3	5.4	3.3
16. The pictures helped me understand this booklet	10.7	18.0	25.0	34.0	8.6
17. The print in this booklet made it easy to read	3.2	4.9	12.8	52.2	28.7
18. I read most of this booklet	5.9	9.8	8.1	45.7	26.7
19. The definitions in the back of this booklet were helpful	3.6	5.3	16.1	44.0	32.1
20. More of the words used in this booklet need to be defined	13.3	29.3	28.8	18.9	11.8

BOOK 1 – SUMMARY NRS: 1967-68

	Grade	SD	D	U	A	SA
1. I thought this booklet was interesting	8	6.3	15.3	12.6	56.8	8.9
	9	---	2.4	17.1	68.3	12.2
	10	---	25.0	5.0	70.0	---
2. I want to find out more about what was in this booklet	8	6.8	25.3	34.2	27.9	4.7
	9	---	19.5	41.5	29.3	9.6
	10	5.0	40.0	25.0	25.0	5.0
3. If the booklet were harder it would be more interesting	8	26.3	38.4	14.2	15.3	5.3
	9	4.9	61.0	22.0	9.6	2.4
	10	10.0	55.0	5.0	20.0	10.0

	Grade	SD	D	U	A	SA
4. This booklet was too hard to read	8	54.2	32.1	5.8	4.2	3.2
	9	63.4	29.3	---	2.4	4.9
	10	55.0	45.0	---	---	---
5. I knew most of the words in this booklet	8	1.6	14.2	6.3	38.4	38.9
	9	---	2.4	9.6	46.3	41.5
	10	---	---	---	65.0	35.0
6. This booklet was about as easy to read as my other school books	8	9.5	20.5	12.6	38.4	18.4
	9	---	9.6	19.5	46.3	22.0
	10	5.0	30.0	---	40.0	20.0
7. This booklet was written for someone younger than me	8	6.8	31.6	27.9	23.7	8.4
	9	14.6	39.0	29.3	14.6	---
	10	---	20.0	30.0	30.0	20.0
8. Each idea in this booklet should be discussed more completely	8	7.9	31.1	27.9	23.2	8.9
	9	2.4	14.6	48.8	26.8	2.4
	10	---	40.0	30.0	20.0	10.0
9. I learned a lot from this booklet	8	7.4	11.6	22.1	45.3	13.2
	9	---	4.9	22.0	48.8	24.4
	10	10.0	10.0	10.0	65.0	5.0
10. I knew most of the things in this booklet before I read it	8	12.1	44.2	21.1	19.5	2.6
	9	12.2	63.4	14.6	7.3	2.4
	10	5.0	45.0	15.0	25.0	5.0
11. This booklet answered questions I have been thinking about	8	4.7	32.6	23.2	33.2	5.3
	9	2.4	26.8	29.3	31.7	7.3
	10	10.0	55.0	5.0	25.0	5.0

	Grade	SD	D	U	A	SA
12. I think the ideas in this booklet are worth knowing	8	2.6	5.3	12.1	58.9	20.5
	9	2.4	---	7.3	63.4	24.4
	10	5.0	5.0	---	75.0	15.0
13. I could understand what this booklet said after discussing it in class	8	5.3	12.6	18.4	48.9	12.6
	9	---	9.6	24.4	46.3	19.5
	10	5.0	5.0	5.0	75.0	10.0
14. This booklet was easy to understand	8	3.2	7.9	15.3	44.7	27.9
	9	---	4.9	9.6	56.1	26.8
	10	---	---	5.0	60.0	35.0
15. This booklet was harder to understand than my other school books	8	36.3	46.8	11.1	4.2	1.1
	9	29.3	65.9	2.4	2.4	---
	10	40.0	55.0	---	---	---
16. The pictures helped me understand this booklet	8	17.9	26.8	20.5	30.0	3.7
	9	7.3	17.1	36.6	31.7	4.9
	10	10.0	25.0	20.0	35.0	10.0
17. The print in this booklet made it easy to read	8	1.1	6.8	12.1	50.1	28.4
	9	---	---	9.6	63.4	26.8
	10	10.0	5.0	---	45.0	35.0
18. I read most of this booklet	8	2.6	13.7	9.5	41.1	31.6
	9	2.4	7.3	2.4	53.7	34.1
	10	5.0	---	---	65.0	25.0
19. The definitions in the back of this booklet were helpful	8	3.7	6.8	17.9	43.2	25.3
	9	4.9	2.4	24.4	43.9	24.4
	10	---	10.0	20.0	65.0	5.0

	Grade	SD	D	U	A	SA
20. More of the words used in this booklet need to be defined	8	16.3	31.1	27.9	15.8	7.4
	9	19.5	46.3	24.4	4.9	4.9
	10	15.0	40.0	20.0	20.0	5.0

BOOK 2 – SUMMARY NRS: 1967-68

	Grade	SD	D	U	A	SA
1. I thought this booklet was interesting	8	4.4	20.1	19.5	45.3	10.7
	9	---	2.1	10.6	83.0	4.3
2. I want to find out more about what was in this booklet	8	4.4	23.3	37.1	30.2	5.0
	9	2.1	17.0	40.4	38.3	2.1
3. If the booklet were harder it would be more interesting	8	17.6	42.8	17.0	14.5	7.5
	9	4.3	55.3	23.4	12.8	4.3
4. This booklet was too hard to read	8	51.6	33.3	6.9	5.0	2.5
	9	46.8	46.8	4.3	---	---
5. I knew most of the words in this booklet	8	3.1	8.8	13.8	42.8	31.4
	9	4.3	2.1	6.4	57.4	29.8
6. This booklet was about as easy to read as my other school books	8	11.9	23.3	14.5	32.1	17.6
	9	---	19.1	2.1	66.0	12.8
7. This booklet was written for someone younger than me	8	8.2	29.6	27.7	23.9	10.7
	9	14.9	44.7	27.7	8.5	2.1

	Grade	SD	D	U	A	SA
8. Each idea in this booklet should be discussed more completely	8	8.8	30.8	32.1	21.4	5.7
	9	---	25.5	44.7	21.3	8.5
9. I learned a lot from this booklet	8	5.7	16.4	27.7	38.4	11.9
	9	---	6.4	21.3	61.7	8.5
10. I knew most of the things in this booklet before I read it	8	7.5	42.8	27.0	19.5	2.5
	9	14.9	57.4	17.0	8.5	2.1
11. This booklet answered questions I have been thinking about	8	8.8	29.6	29.6	28.9	2.5
	9	---	23.4	29.8	44.7	2.1
12. I think the ideas in this booklet are worth knowing	8	2.5	5.0	20.8	56.6	15.1
	9	---	---	8.5	68.1	23.4
13. I could understand what this booklet said after discussing it in class	8	6.3	13.2	20.1	48.4	11.3
	9	---	8.5	17.0	63.8	10.6
14. This booklet was easy to understand	8	1.3	4.4	15.7	46.5	30.8
	9	2.1	4.3	14.9	55.3	23.4
15. This booklet was harder to understand than my other school books	8	37.1	40.3	17.6	3.8	1.3
	9	27.7	63.8	6.4	---	2.1
16. The pictures helped me understand this booklet	8	13.8	28.9	22.0	28.9	6.3
	9	4.3	19.1	23.4	51.1	2.1
17. The print in this booklet made it easy to read	8	1.9	5.7	15.1	50.3	27.0
	9	2.1	---	4.3	59.6	34.0

	Grade	SD	D	U	A	SA
18. I read most of this booklet	8	6.3	13.8	10.7	50.3	18.9
	9	---	4.3	10.6	59.6	25.5
19. The definitions in the back of this booklet were helpful	8	5.0	7.5	25.2	40.3	22.0
	9	---	6.4	27.7	59.6	6.4
20. More of the words used in this booklet need to be defined	8	15.1	29.6	28.3	19.5	7.5
	9	8.5	34.0	36.2	12.8	6.4

BOOK 3 – SUMMARY NRS: 1967-68

	Grade	SD	D	U	A	SA
1. I thought this booklet was interesting	8	9.5	16.7	34.1	34.9	4.0
	9	---	5.1	10.3	76.9	7.7
	10	7.7	28.2	23.1	41.0	---
2. I want to find out more about what was in this booklet	8	14.3	29.4	31.7	19.8	4.0
	9	---	12.8	46.2	38.5	2.6
	10	7.7	33.3	41.0	17.9	---
3. If the booklet were harder it would be more interesting	8	21.4	32.5	25.4	16.7	4.0
	9	12.8	46.2	33.3	5.1	2.6
	10	12.8	30.8	20.5	33.3	2.6
4. This booklet was too hard to read	8	50.0	32.5	12.7	2.4	2.4
	9	46.2	46.2	7.7	---	---
	10	56.4	43.6	---	---	---

	Grade	SD	D	U	A	SA
5. I knew most of the words in this booklet	8	7.1	7.1	15.9	31.9	34.1
	9	---	---	12.8	56.4	28.2
	10	2.6	5.1	10.3	53.8	28.2
6. This booklet was about as easy to read as my other school books	8	12.7	20.6	13.5	27.0	26.2
	9	5.1	20.5	15.4	51.3	7.7
	10	7.7	23.1	7.7	30.8	30.8
7. This booklet was written for someone younger than me	8	11.9	26.2	27.0	23.8	11.1
	9	7.7	46.2	28.2	12.8	2.6
	10	5.1	15.4	17.9	33.3	28.2
8. Each idea in this booklet should be discussed more completely	8	15.1	26.2	27.8	20.6	8.7
	9	5.1	25.6	23.1	43.6	---
	10	7.7	17.9	51.3	17.9	5.1
9. I learned a lot from this booklet	8	10.3	18.3	36.5	26.2	7.9
	9	---	10.3	30.8	51.3	7.7
	10	5.1	17.9	23.1	53.8	---
10. I knew most of the things in this booklet before I read it	8	11.9	37.3	25.4	18.3	7.1
	9	5.1	59.0	25.6	10.3	---
	10	5.1	53.8	25.6	10.3	5.1
11. This booklet answered questions I have been thinking about	8	9.5	23.0	34.1	30.2	3.2
	9	---	28.2	20.5	41.0	7.7
	10	2.6	43.6	17.9	35.9	---
12. I think the ideas in this booklet are worth knowing	8	3.2	7.1	17.5	55.6	15.9
	9	---	---	5.1	74.4	17.9
	10	---	---	15.4	76.9	7.7

	Grade	SD	D	U	A	SA
13. I could understand what this booklet said after discussing it in class	8	6.3	11.9	23.0	42.1	16.7
	9	2.6	7.7	20.5	61.5	7.7
	10	—	7.7	12.8	56.4	23.1
14. This booklet was easy to understand	8	.8	10.3	21.4	41.3	24.6
	9	—	10.3	15.4	53.8	15.4
	10	—	2.6	12.8	51.3	33.3
15. This booklet was harder to understand than my other school books	8	39.7	34.9	11.9	8.7	.8
	9	28.2	48.7	15.4	7.7	—
	10	56.4	41.0	2.6	—	—
16. The pictures helped me understand this booklet	8	13.5	23.0	27.8	27.8	7.1
	9	5.1	20.5	35.9	33.3	5.1
	10	20.5	38.5	23.1	15.4	2.6
17. The print in this booklet made it easy to read	8	2.4	7.1	18.3	38.1	33.3
	9	—	5.1	7.7	66.7	20.5
	10	20.5	38.5	23.1	15.4	2.6
18. I read most of this booklet	8	15.1	23.8	11.9	42.9	5.6
	9	2.6	2.6	7.7	66.7	17.9
	10	—	2.6	2.6	53.8	41.0
19. The definitions in the back of this booklet were helpful	8	4.8	5.6	19.8	38.1	31.7
	9	—	12.8	23.1	53.8	10.3
	10	5.1	12.8	15.4	38.5	25.6

	Grade	SD	D	U	A	SA
20. *More of the words used in this booklet need to be defined*	8	10.3	27.0	34.9	14.3	13.5
	9	7.7	56.4	28.2	5.1	2.6
	10	5.1	5.1	25.6	51.3	12.8

BOOK 4 - SUMMARY NRS: 1967-8

	Grade	SD	D	U	A	SA
1. *I thought this booklet was interesting*	8	7.9	12.7	27.0	48.4	3.2
	9	-------	-------	-------	75.0	25.0
	10	3.3	18.3	31.7	45.0	1.7
2. *I want to find out more about what was in this booklet*	8	7.1	31.7	37.3	20.6	3.2
	9	-----	5.0	40.0	50.0	5.0
	10	1.7	41.7	31.7	21.7	3.3
3. *If the booklet were harder it would be more interesting*	8	19.8	37.3	22.2	17.5	3.2
	9	15.0	50.0	30.0	5.0	------
	10	10.0	36.7	18.3	28.3	6.7
4. *This booklet was too hard to read*	8	41.3	42.1	9.5	5.6	1.6
	9	65.0	30.0	-------	5.0	------
	10	48.3	46.7	3.3	------	------
5. *I knew most of the words in this booklet*	8	4.0	11.9	18.3	46.0	19.8
	9	5.0	10.0	15.0	65.0	5.0
	10	--------	8.3	3.3	66.7	21.7

	Grade	SD	D	U	A	SA
6. This booklet was about as easy to read as my other school books	8	4.8	24.6	14.3	38.9	17.5
	9	------	25.0	------	40.0	35.0
	10	1.7	35.0	8.3	25.0	30.0
7. This booklet was written for someone younger than me	8	12.7	36.5	22.2	17.5	10.3
	9	10.0	55.0	30.0	5.0	------
	10	1.7	18.3	21.7	33.4	25.0
8. Each idea in this booklet should be discussed more completely	88	11.9	21.4	29.4	24.6	12.7
	9	10.0	30.0	30.0	25.0	5.0
	10	6.7	25.0	41.7	25.0	1.7
9. I learned a lot from this booklet	88	8.7	15.1	38.9	34.1	2.4
	9	------	------	5.0	70.0	25.0
	10	1.7	15.0	31.7	50.0	1.7
10. I knew most of the things in this booklet before I read it	8	13.5	36.5	28.6	17.5	3.2
	9	15.0	60.0	15.0	5.0	------
	10	8.3	51.7	25.0	15.0	------
11. This booklet answered questions I have been thinking about	8	8.7	31.0	34.1	22.2	2.4
	9	------	15.0	20.0	60.0	5.0
	10	------	35.0	33.3	30.0	1.7
12. I think the ideas in this booklet are worth knowing	8	2.4	10.3	18.3	54.8	13.5
	9	------	------	------	65.0	35.0
	10	------	6.7	18.3	66.7	8.3

	Grade	SD	D	U	A	SA
13. *I could understand what this booklet said after discussing it in class*	8	3.2	15.9	19.8	47.6	11.1
	9	-----	-----	10.0	70.0	15.0
	10	-----	5.0	13.3	68.3	13.3
14. *This booklet was easy to understand*	8	2.4	13.5	14.3	48.4	19.8
	9	-----	10.0	5.0	65.0	20.0
	10	-----	10.0	13.3	58.3	18.3
15. *This booklet was harder to understand than my other school books*	8	35.7	34.9	13.5	10.3	2.4
	9	35.0	50.0	10.0	-----	-----
	10	35.0	51.7	10.0	3.3	-----
16. *The pictures helped me understand this booklet*	8	11.9	29.4	2.54	27.0	6.3
	9	-----	20.0	25.0	50.0	5.0
	10	13.3	20.0	33.3	30.0	3.3
17. *The print in this booklet made it easy to read*	8	4.0	4.0	10.3	50.0	30.2
	9	-----	5.0	5.0	55.0	35.0
	10	-----	3.3	5.0	65.0	26.7
18. *I read most of this booklet*	8	9.5	19.8	10.3	46.0	13.5
	9	-----	-----	5.0	75.0	20.0
	10	3.3	8.3	8.3	66.7	13.3
19. *The definitions in the back of this booklet were helpful*	8	2.4	4.0	16.7	45.2	31.0
	9	-----	-----	5.0	60.0	35.0
	10	1.7	6.7	16.7	51.7	23.3
20. *More of the words used in this booklet need to be defined*	8	8.7	34.9	30.2	16.7	9.5
	9	10.0	50.0	25.0	15.0	-----
	10	6.7	30.0	31.7	23.3	8.3

BOOK 5 - SUMMARY NRS: 1967-8

	Grade	SD	D	U	A	SA
1. I thought this booklet was interesting	8	3.0	16.2	25.3	48.5	7.1
	9	------	------	19.1	72.7	18.2
	10	12.2	17.1	24.4	41.5	4.9
2. I want to find out more about what was in this booklet	8	15.2	27.3	37.4	20.2	------
	9	------	9.1	45.5	45.5	------
	10	4.9	29.3	39.0	24.4	2.4
3. If the booklet were harder it would be more interesting	8	16.2	44.4	17.2	13.1	7.1
	9	13.6	63.6	13.6	9.1	------
	10	9.8	22.0	24.4	24.4	17.1
4. This booklet was too hard to read	8	48.5	35.4	10.1	2.0	4.0
	9	50.0	27.3	9.1	4.5	9.1
	10	53.7	39.0	2.4	------	2.4
5. I knew most of the words in this booklet	8	3.0	9.1	13.1	48.5	26.3
	9	------	27.3	18.2	27.3	27.3
	10	2.4	12.2	4.9	61.0	19.5
6. This booklet was about as easy to read as my other school books	8	16.2	20.2	19.2	26.2	17.2
	9	------	9.1	13.6	63.3	13.6
	10	12.2	31.7	4.9	31.7	19.5
7. This booklet was written for someone younger than me	8	8.1	30.3	24.2	22.2	12.1
	9	4.5	54.5	27.3	13.6	------
	10	2.4	14.6	12.2	48.8	19.5

	Grade	*SD*	*D*	*U*	*A*	*SA*
8. *Each idea in this booklet should be discussed more completely*	8	8.1	33.3	33.3	13.1	12.1
	9	9.1	22.7	36.4	22.7	4.5
	10	2.4	24.4	39.0	29.3	4.9
9. *I learned a lot from this booklet*	8	3.0	22.2	29.3	33.3	9.1
	9	—	9.1	18.2	50.0	22.7
	10	14.6	19.5	22.0	34.1	2.4
10. *I knew most of the things in this booklet before I read it*	8	10.1	39.4	27.3	20.2	2.0
	9	4.5	72.7	9.1	4.5	—
	10	7.3	46.3	19.5	22.0	4.9
11. *This booklet answered questions I have been thinking about*	8	5.1	36.4	27.3	21.2	8.1
	9	—	18.2	18.2	54.5	9.1
	10	17.1	24.4	26.8	29.3	2.4
12. *I think the ideas in this booklet are worth knowing*	8	2.0	6.1	21.2	54.5	15.2
	9	—	—	4.5	63.6	31.8
	10	7.3	7.3	2.4	70.7	12.2
13. *I could understand what this booklet said after discussing it in class*	8	4.0	12.1	23.2	45.6	15.2
	9	—	—	9.1	81.8	4.5
	10	2.4	7.3	22.0	46.3	22.0
14. *This booklet was easy to understand*	8	1.0	11.1	16.2	42.4	28.3
	9	—	—	13.6	50.0	31.8
	10	—	12.2	9.8	51.2	26.8

	Grade	SD	D	U	A	SA
15. *This booklet was harder to understand than my other school books*	8	39.4	37.4	16.2	5.1	2.0
	9	31.8	59.1	9.1	-------	-------
	10	46.3	39.0	9.8	2.4	2.4
16. *The pictures helped me understand this booklet*	8	11.1	22.2	27.3	33.3	5.1
	9	9.1	22.7	13.6	50.0	4.5
	10	17.1	17.1	26.8	34.1	4.9
17. *The print in this booklet made it easy to read*	8	1.0	5.1	14.1	41.4	38.4
	9	-------	4.5	13.6	40.9	36.4
	10	2.4	7.3	12.2	43.9	31.7
18. *I read most of this booklet*	8	10.1	21.2	6.1	46.5	16.2
	9	-------	9.1	13.6	59.1	18.2
	101	7.3	19.5	12.2	48.8	12.2
19. *The definitions in the back of this booklet were helpful*	8	2.0	4.0	13.1	49.5	30.3
	9	-----	9.1	9.1	31.8	50.0
	10	2.4	9.8	12.2	41.5	34.1
20. *More of the words used in this booklet need to be defined*	8	7.1	41.4	30.3	16.2	5.1
	9	-------	50.0	31.8	18.2	-------
	10	7.3	39.0	19.5	26.8	7.3

BOOK 6 - SUMMARY NRS; 1967 - 8

	Grade	*SD*	*D*	*U*	*A*	*SA*
1. *I thought this booklet was interesting*	8	------	11.4	24.3	52.9	11.4
	9	------	------	5.0	90.0	5.0
2. *I want to find out more about what was in this booklet*	8	4.3	28.6	35.7	21.4	10.0
	9	------	5.0	35.0	55.0	5.0
3. *If the booklet were harder it would be more interesting*	8	10.0	42.9	20.0	18.6	7.1
	9	15.0	40.0	25.0	15.0	5.0
4. *This booklet was too hard to read*	8	51.4	35.7	12.9	------	------
	9	35.0	45.0	10.0	5.0	5.0
5. *I knew most of the words in this booklet*	8	4.3	5.7	20.0	41.4	27.1
	9	------	5.0	10.0	60.0	25.0
6. *This booklet was about as easy to read as my other school books*	8	8.6	25.7	15.7	32.9	14.3
	9	------	15.0	15.0	50.0	20.0
7. *This booklet was written for someone younger than me*	8	4.3	32.9	24.3	20.0	18.6
	9	5.0	55.0	20.0	20.0	------
8. *Each idea in this booklet should be discussed more completely*	8	4.3	28.6	38.6	17.1	11.4
	9	------	50.0	20.0	25.0	5.0
9. *I learned a lot from this booklet*	8	2.9	20.0	37.1	25.7	12.9
	9	------	------	25.0	65.0	10.0

	Grade	SD	D	U	A	SA
10. *I knew most of the things in this booklet before I read it*	8	5.7	35.7	37.1	15.7	4.3
	9	-------	65.0	10.0	10.0	10.0
11. *This booklet answered questions I have been thinking about*	8	10.0	18.6	37.1	30.0	4.3
	9	------	5.0	30.0	60.0	5.0
12. *I think the ideas in this booklet are worth knowing*	8	1.4	5.7	18.6	54.3	20.0
	9	-------	-------	20.0	65.0	15.0
13. *I could understand what this booklet said after discussing it in class*	8	2.9	14.3	25.7	42.9	12.9
	9	------	5.0	20.0	60.0	15.0
14. *This booklet was easy to understand*	8	2.9	8.6	22.9	35.7	30.0
	9	------	10.0	15.0	60.0	15.0
15. *This booklet was harder to understand than my other school books*	8	44.3	35.7	14.3	1.4	2.9
	9	20.0	65.0	------	15.0	------
16. *The pictures helped me understand this booklet*	8	10.0	22.9	34.3	28.6	4.3
	9	15.0	10.0	5.0	60.0	10.0
17. *The print in this booklet made it easy to read*	8	1.4	4.3	20.0	42.9	30.0
	9	-------	5.0	15.0	40.0	35.0
18. *I read most of this booklet*	8	14.3	14.3	10.0	44.3	15.7
	9	----	10.0	10.0	65.0	10.0
19. *The definitions in the back of this booklet were helpful*	8	1.4	4.3	18.6	42.9	32.9
	9	-------	10.0	5.0	50.0	30.0
20. *More of the words used in this booklet need to be defined*	8	10.0	37.1	35.7	11.1	5.7
	9	5.0	45.0	15.0	25.0	10.0

BOOK 7 - SUMMARY NRS: 1967-8

	Grade	SD	D	U	A	SA
1. *I thought this booklet was interesting*	8	7.2	14.3	16.1	57.1	5.4
	9	50.0	27.3	13.6	9.1	------
	10	4.3	28.3	17.4	43.5	6.5
2. *I want to find out more about what was in this booklet*	8	5.4	41.1	28.6	19.6	5.4
	9	50.0	27.3	18.2	4.5	------
	10	------	39.1	34.8	21.7	4.3
3. *If the booklet were harder it would be more interesting*	8	12.5	55.4	21.4	8.9	1.8
	9	54.5	18.2	9.1	13.6	4.5
	10	8.7	43.5	15.2	28.3	4.3
4. *This booklet was too hard to read*	8	33.9	51.8	3.6	7.2	1.8
	9	40.9	36.4	9.1	4.5	9.1
	10	37.0	50.0	6.5	4.3	2.2
5. *I knew most of the words in this booklet*	8	3.6	19.6	14.3	46.4	16.1
	9	------	9.1	4.5	59.1	27.3
	10	2.2	10.9	10.9	47.8	28.3
6. *This booklet was about as easy to read as my other school books*	8	7.2	21.4	7.2	48.2	16.1
	9	13.6	13.6	9.1	36.4	27.4
	10	6.5	26.1	8.7	45.7	13.0
7. *This booklet was written for someone younger than me*	8	5.4	53.6	19.6	14.3	7.2
	9	22.7	22.7	22.7	9.1	22.7
	10	4.3	15.2	26.1	34.8	19.6

	Grade	SD	D	U	A	SA
8. Each idea in this booklet should be discussed more completely	8	16.1	35.7	33.9	10.7	3.6
	9	13.6	9.1	18.2	27.3	31.8
	10	2.2	26.1	47.8	19.6	4.3
9. I learned a lot from this booklet	8	10.7	14.3	12.5	48.2	10.7
	9	40.9	31.8	4.5	18.2	------
	10	6.5	23.9	26.1	26.1	15.2
10. I knew most of the things in this booklet before I read it	8	8.9	42.9	17.9	26.8	3.6
	9	9.1	22.7	22.7	27.3	18.2
	10	------	37.0	30.4	30.4	2.2
11. This booklet answered questions I have been thinking about	8	7.2	25.0	25.0	39.3	1.8
	9	50.0	18.2	18.2	13.6	------
	10	2.2	28.3	26.1	41.3	2.2
12. I think the ideas in this booklet are worth knowing	8	7.2	5.4	19.6	60.7	5.4
	9	40.9	31.8	4.5	18.2	------
	10	------	10.9	4.3	63.0	21.7
13. I could understand what this booklet said after discussing it in class	8	1.8	17.9	16.1	51.8	10.7
	9	9.1	22.7	22.7	27.3	18.2
	10	------	6.5	28.3	52.2	13.0
14. This booklet was easy to understand	8	------	17.9	14.3	46.4	21.4
	9	50.0	18.2	18.2	13.6	------
	10	------	4.3	10.9	58.7	23.9
15. This booklet was harder to understand than my other school books	8	30.4	48.2	10.7	10.7	------
	9	18.2	13.6	27.3	36.1	------
	10	39.1	52.2	2.2	4.3	2.2

	Grade	SD	D	U	A	SA
16. The pictures helped me understand this booklet	8	7.2	32.1	21.4	33.9	3.6
	9	22.7	9.1	36.4	18.2	13.6
	10	10.9	21.7	30.4	30.4	6.5
17. The print in this booklet made it easy to read	8	1.8	8.9	10.7	48.2	28.6
	9	9.1	9.1	22.7	40.9	13.6
	10	------	6.5	10.9	54.3	28.3
18. I read most of this booklet	8	12.5	23.2	1.8	44.6	17.9
	9	31.8	31.8	13.6	18.2	4.5
	10	10.9	15.2	8.7	52.2	13.0
19. The definitions in the back of this booklet were helpful	8	3.6	10.7	10.7	50.0	25.0
	9	27.3	9.1	9.1	31.8	22.7
	10	4.3	10.9	21.7	41.3	21.7
20. More of the words used in this booklet need to be defined	8	16.1	35.7	30.4	14.3	3.6
	9	9.1	9.1	31.8	18.2	27.3
	10	4.3	39.1	15.2	34.8	6.5

Appendix H

STUDENT ENTERPRISE ACTIVITY

by

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June, 1970

American Industry Project
USOE Contract No. OE-5-85-060
Co-Directors:
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One of the major activities included in the first level American Industry materials was the student enterprise. In this activity the students designed or selected a product and determined if there was a market for it. If it was economically feasible to produce and market this product the students established a production and marketing system for it. Necessary supplies and materials were procured for the students' enterprise. Then the students went on to produce the product and market it. After the marketing activities had been completed, expenses and income were determined and the profits or losses were identified.

The goals of the student enterprise were to provide referents for all the concepts and the interactions between the concepts identified in the American Industry structure. In addition, the developers of the secondary curriculum wanted to provide a simulated experience in developing, operating, managing an enterprise. Finally, activities were sought to provide a basis for student interest in the American Industry course.

Student learning materials and instructional materials for the teachers were developed to provide the information and directions required to initiate and carry out the student enterprise activity. These materials were designed to meet the goals described in the previous paragraphs and were based upon the Project's conceptual structure of the knowledges of industry.

After the materials for the student enterprise had been developed an evaluation was designed to determine if the enterprise was meeting the goals set forth. An opinionnaire was constructed to assess the students' opinions of the enterprise activity. Table 1 contains a summary of the students' responses to this opinionnaire. The opinionnaire was completed immediately after the first unit in the first level course. This unit was culminated with a student enterprise.

TABLE I
SUMMARY OF RESPONSES ON THE STUDENT ENTERPRISE: 1967-68
American Industry Classes

Key: SD = Strongly Disagree, D = Disagree, U = Uncertain, A = Agree, SA = Strongly Agree, NR = No Response

	ITEM	*SD*	*D*	*U*	*A*	*SA*	*NR*
1.	*I like the student enterprise activity*	3.5	2.8	10.0	52.1	31.4	0.
2.	*I liked the group work involved in the student enterprise*	2.	7.2	14.1	55.4	21.1	.2
3.	*Making a profit on products we sold added interest to this activity*	2.6	8.6	13.4	42.4	31.6	1.5
4.	*Selling products produced in student enterprise was interesting*	2.4	9.2	27.9	43.3	16.3	.9
5.	*The student enterprise should be eliminated from this course*	52.8	26.8	11.6	4.	4.	.6

* *Figures in the table are percentages. There were 545 opinionnaires completed.*

The interest value of the student enterprise activity is identified in Item 1 and 5 in Table 1. A review of the responses to item one indicates that approximately 84.5% of the responses agree or strongly agree that the student enterprise activity was interesting. Only 6.3% of the respondents indicated that they did not like the student enterprise activity. On item five 79.6% indicated that the student enterprise should be retained as an activity in the course. Eight per cent thought that it could be eliminated. The high level of favorable response to the student enterprise activity would indicate that it holds a significant attraction for the students. Moreover comparing the responses on item one to those on item six reveals that the student enterprise activity is liked to a greater degree than the class in general.

Items two, three, and four refer to the students' interest in specific parts of the student enterprise. These questions were stimulated to a great degree by questions referred to the project by industrial arts teachers and industrial arts teacher educators. For the most part they represent significant changes in the types of activities that would take place in the industrial arts laboratory. Responses to item three indicate that a large majority of the students, 73.5% to be exact, liked the group work involved in the student enterprise. Approximately 9% dislike the group work. On item four, 74% of the responders indicated that making a profit added to the interest of the activity. Approximately 11% thought that this detracted from their interest. The degree of agreement with item four was not as high as on the items just discussed. However, 59.6% thought that selling the products produced in the enterprise was an interesting activity and only 11.6% did not think that it was interesting. A fairly large number, 27.9% were undecided as to the interest value of this portion of the enterprise. Items seven, eight, and nine in Table 1 give some insight into the impact of the student enterprise activity on the students' learning. However, the responses to these items also reflect the influence of the complete set of instructional materials and the quality of instruction encountered during the first unit. The summary of responses indicates that there has been a significant affect upon learning. For example, 77.2% of the students thought that they had learned a lot about industry in class up to this point (Item seven). One item nine, 70.4% indicated that they had a greater appreciation for industry after studying it in class. Only 9.1% thought that their appreciation had not increased. Additional information on the learning outcomes resulting from the student enterprise activity can be observed in Table 2. The responses in this table are for the following multiple choice item that appeared in the Unit One Achievement Test.

> An enterprises expenses in producing a service are $100. Customers pay a total of $125 for this service. What is the $25.?
>
> A. Surplus
> B. Expense
> C. Interest
> D. Profit

The analysis of the data in Table 2 reveals that the American Industry groups outscored the control groups in each of the four schools presented in the table. The control groups specified in Table 2 are equivalent groups. In these settings the traditional experimental paradigm was used. On the basis of these data, it appears that the student enterprise activity also has an important influence on the cognitive knowledges developed by the students, for the discussion of profit and its calculation was centered basically in the student enterprise activity. In other words, only slight mention was made of profit in the first level materials outside of the student enterprise activity. In summary, the data presented in this report indicate that the student enterprise activity presents an interesting learning experience in an effective instructional setting.

TABLE 2

SUMMARY OF RESPONSES TO ITEM 30 ON THE UNIT I ACHIEVEMENT TEST

School		*Choice*				
		A	*B*	*C*	*D (Correct)*	*Omit*
A	*A.I.*	*0*	*2.3* *	*0*	*97.7*	*0*
	Control	*4.4*	*8.7*	*8.7*	*73.9*	*4.35*
B	*A.I.*	*6.3*	*2.1*	*2.1*	*89.6*	*0*
	Control	*7.3*	*4.9*	*2.4*	*85.4*	*0*
C	*A.I.*	*0*	*4.6*	*0*	*95.5*	*0*
	Control	*0*	*9.4*	*6.3*	*84.4*	*0*
D	*A.I.*	*6.5*	*3.2*	*12.9*	*77.4*	*0*
	Control	*11.4*	*17.1*	*14.3*	*57.1*	*0*

* *Numbers in the table are percentages.*

SUMMARY OF PARTICIPATING
TEACHERS' RESPONSES ON THE
1967-68 END OF YEAR REPORT

by

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November, 1968

American Industry Project
USOE Contract No. OE-5-85-060
Co-Directors:
Dr. Wesley L. Face
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Introduction

During the past four years, the American Industry Project has been comprised of participating teachers, their students and the Project staff members at Stout State University. The participating teachers have had an active and integral role in the development of the Project's instructional materials. In addition, these men have been responsible for the classroom implementation of the secondary school courses in American Industry. Hence, each participating teacher represents a valuable source of information on the American Industry courses and the instructional materials used in them.

Data Collection and Analysis

Prior to the 1967-68 school year each participating teacher was asked to submit a formal written report at the end of the school year. This report detailed the accomplishments, problems, and questions the teacher had identified during the year. This procedure produced many illuminating comments, but it also suffered from lack of scope and consistency. As a result, the information returned to the Project staff at Stout did not provide the information required to revise instructional materials and the structure of the courses.

In order to alleviate these deficiences, a more structured instrument was designed for use as the end of the year report. The first step in designing this instrument entailed identification of the general area of concern associated with the American Industry courses developed for the secondary school. After study of the information required to develop and revise American Industry courses, six areas related to teaching these courses and the associations between the teachers and the Project staff appeared to be germane. These areas will be more specifically delineated in succeeding paragraphs.

After the general categories were defined, several comments or statements were written for each category providing for teacher responses in the areas in which information was needed. An illustration of this is item number eight which reads "I could not understand the material in the Instructor's Guide." Obviously, this understanding is essential if the guide is to be of any use to the teacher. A large number of unfavorable responses would point out the need for changing the guide, or engaging in further inservice training of the teachers. In like manner, each statement directed attention to input factors over which the Project could exert some influence.

All of the statements in the End of Year Report are listed in Table 1 which is attached to the end of this report. The general areas identified in the first step of constructing the report and the items in each category are listed below:

Teacher Acts and Teaching Activities	Content Competencies of the Teacher	Utility of Project-Supplied Instructional Materials
Items: 1 - 7	Items: 14	Items: 8 - 11
12	23 - 24	15 - 22
29	32	25
36 - 37	38	28
65	47 - 49	33 - 35
67	59 - 60	39
	63 - 64	42
	66	50
		61 - 61
		68

American Industry Workshops	Student Competencies	School & Community Relations
Items: 51 - 58	Items: 13	Items: 27
69	26	40 - 41
	30 - 31	43 - 46

At the conclusion of the 1967-68 school year, each teacher compelted an End of Year Report for each Level of American Industry he had taught. The completed reports were returned to Stout where the data were key punched and the summary printed in Table 1 was run on the computer. Table 1 presents a summary of the responses for Levels I & II. Only one teacher had enough students to offer a Level III class during that school year and his responses for Level III were not included in the summary. Five teachers taught Level II classes; thus, the response summary represents, for the most part, the teachers' opinions of Level I.

The objective of this report was to give a general overview of responses on the End of Year Report. Therefore, responses for Levels I and II were pooled into one summary. When more detailed analyses are run at a later date the two sets of responses will be handled separately The ensuing paragraphs will give a general summary of the results in each cateogry. An invitation is extended to the reader to examine each item and assess its implications.

Responses in the content competencies category revealed that the teachers felt some need for further information in each concept area. This was particularly true on the five concepts of transportation, management, materials, processes, and energy.

In the other categories, the response patterns reflected favorably on the activities of the Project and the participating teachers. Instructional materials developed by the Project were favorably rated with two exceptions. First, some had trouble completing the course; and second, most desired more flexibility in the Instructor' Guide. The teachers' school and community relations appeared to be positive. Student competencies were for the most part favorably rated by the instructors. Workshops conducted by the Project received a positive rating and some valuable comments for future programs were noted by the teachers. Responses in the teacher acts and teacher activities area were mixed. More will be said about this in the next section.

Discussion

Most of the responses to the items in the teacher acts and learning activities category were favorable. Responses to items two, three, thirty-six, and thirty-seven indicate that a variety of instructional techniques and resources were utilized by the teachers. Use of businesses in the community to illustrate the concepts of industry is especially valuable in linking the students' world to the larger frame of reference encompassed in American Industry (item thirty-seven). In addition, the teachers' responses to item sixty-seven indicate that they are not as concerned with the extrinsic value of a project as they are with its possible qualifications as a learning expedient.

Although the teachers appear to have made good use of a variety of learning activities, they also appear to have overlooked two others. Less than half of the group used visiting speakers. And, only half of the teachers scheduled a field trip to observe an enterprise. This last omission would appear to have slighted their students' interests as expressed in the Unit VII Opinionnaire. On the first item in this opinionnaire approximately eighty-two per cent of the American Industry students responsed that they would like to visit a business to see how it is operated. Another area of concern is related to item twenty-nine. It is conceivable that the teacher may unduly reduce the problem-solving opportunities in their classes. All of the concerns noted in this paragraph were communicated to the participating teachers during the past summer.

Response to the items that pertain to the amount of understanding and information the teachers have in the concept areas revealed several in which there was a deficiency. On the basis of these data, two steps were taken to assist the participating teachers. First, the Curriculum Specialist, Richard Gebhart, obtained literature related to these concepts from industry and distributed it to the teachers. Second, most of the morning session of the September on-campus workshop was devoted to a lecture-discussion of the management concept by a member of the Industrial Technology Department at Stout.

There was a favorable response to all items in the student competencies category except for one dealing with the amount of responsibility the students could assume in the student enterprise toward the end of the first level course. The full impact of this response is received when the response patterns for items twenty-nine and sixty-five are considered in conjunction with it. On item twenty-nine, eighteen teachers agreed that they did a lot of work to assure the success of the student enterprise. Later, on item sixty-five, fourteen agreed that they do whatever is necessary to successfully complete a product or activity. Considering these responses in aggregate the apparent conclusion is that the teachers are somewhat reluctant to let their students fail or make mistakes in the learning activities. Unfortunately, this undue concern may deter the use of problem-solving activities or make them so barren as to be useless. This concern was also expressed to the participating teachers.

On the basis of the responses in the school and community relations category the teachers seem to be doing an effective job of public relations with their peers, administrators, and community. The Project's workshops also received a favorable response. In addition, the teachers' comments on item sixty-nine were considered in scheduling 1968-69 workshops. Agendas were lengthened and more outside speakers were scheduled.

With but two exceptions, the response patterns on the items related to the utility of the Project's instructional materials were favorable. The teachers indicated that more test items should be included in the guides and that provision should be made for more flexibility in teaching the courses and using the guides. Time was not available to develop more test items. However, provisions were made for each teacher to modify his course within the bounds of the American Industry rationale.

Review of a sub-set of the items in this category which drew a favorable response will further illustrate the value of the information provided by this opinionnaire. Items eight, sixteen, seventeen, thirty-three, thirty-nine and sixty-two comprise this sub-set. Responses to these items reflect the teachers' positive opinions on the quality of the format and contents of the lessons in the guide and the degree of improvement made in the guide. These data suggest that the Project can continue to employ the lesson format, the style of writing used in the lessons, and the level of detail utilized in the lessons.

Summary

Use of a structured report form for the American Industry teachers provided the Project with a wealth of data in several areas related to the development of instructional materials and implementation of secondary school courses in American Industry. Opinions were obtained from all teachers on each of the items; thus, decisions could be made on the basis of the opinion of the entire group. The written report originally used usually gave a variety of responses with any one response being listed by only a few teachers.

Overall, the responses were favorable. Some actual and potential problems were identified and the participating teachers were informed of these.

TABLE I
SUMMARY OF RESPONSES ON THE 1967-68 END OF YEAR REPORT FOR LEVELS I & II

SD = Strongly Disagree　　*D = Disagree*
U = Uncertain　　*A = Agree*
SA = Strongly Agree　　*NR = No Response*

		SD	D	U	A	SA	NR
1.	*I found that students could apply their knowledge in science and math in my American Industry classes . . . .*	*0*	*3*	*4*	*12*	*1*	*1*
2.	*I used buzz groups during the year to discuss various questions . . . .*	*1*	*2*	*1*	*9*	*7*	*1*
3.	*I used brainstorming in class to come up with ideas . . . .*		*2*	*0*	*9*	*9*	*9*
4.	*Visiting speakers talked to my American Industry classes . . . .*	*8*	*4*	*0*	*3*	*5*	*1*
5.	*We went on field trips to see enterprises*	*7*	*3*	*0*	*6*	*4*	*1*
6.	*I frequently assigned reading in the student booklets as homework . . . . .*	*6*	*3*	*1*	*3*	*7*	*1*
7.	*Students were not allowed to take their student booklets out of the school building*	*15*	*1*	*4*	*0*	*0*	*1*
8.	*I could not understand the material in the Instructor's Guide . . . .*	*11*	*4*	*3*	*2*	*0*	*1*
9.	*Effective use of the overhead transparencies requires too much narration by me . . . .*	*11*	*4*	*4*	*1*	*0*	*1*
10.	*Use of overhead transparencies retains the students' attention better than straight lectures . . . .*	*0*	*0*	*3*	*5*	*12*	*1*
11.	*I have more instructional resources to use in my inducatrial arts classes . . .*	*6*	*8*	*5*	*0*	*1*	*1*
12.	*I used small enterprises throughtout the year to help provide meaningful activity*	*1*	*4*	*1*	*7*	*7*	*1*
13.	*In Unit VII, the students were able to carry out all of the achitivites of industry with very little help from me . . . . . .*	*3*	*7*	*5*	*3*	*1*	*2*
14.	*I need more information in the transportation concept area . . . .*	*2*	*4*	*7*	*6*	*1*	*1*
15.	*I would not be able to teach the course without the Instructor's Guide . . . .*	*2*	*2*	*4*	*8*	*4*	*1*
		SD	*D*	*U*	*A*	*SA*	*NR*
16.	*This year's guide is much better than last year's . . . .*	*0*	*0*	*3*	*7*	*9*	*2*
17.	*The format of the guide is easy to follow*	*1*	*0*	*1*	*11*	*7*	*1*

		SD	D	U	A	SA	NR
18.	Unit introductions in the guide are of little help	8	9	2	0	0	2
19.	More test items should be included . . .	0	1	3	7	9	1
20.	The complete tests included in Units I & VII were effective in my classes . . .	0	3	3	7	7	1
21.	The narrative in the lessons did not give enough content	5	7	5	3	0	1
22.	I could tell by the narrative in the lessons when I was to use discussion or other student involvement	0	3	4	9	4	1
23.	I have sufficient background to teach the finance lessons	1	8	2	6	3	1
24.	I need more information in the property concept area	3	6	5	6	0	1
25.	The Instructor's Guide did not provide for discussing local enterprises	7	10	2	1	0	1
26.	Most students could identify the concepts used by Wes as he managed Pronto PreFabs	2	0	7	9	1	2
27.	My school does not like to have students sell products produced in school	6	11	2	0	1	1
28.	The student enterprise activity works effectively in my class	1	0	1	8	10	1
29.	I had to do a lot of work to assure that my student enterprise would be a success	0	2	0	11	7	1
30.	My American Industry students improved their conceptual style of reasoning	0	1	8	9	2	1
31.	Safe working habits were hard to develop	3	10	1	5	1	1
32.	I have enough background in the research concept area to teach it effectively	1	2	5	9	3	1
33.	The lessons did not go into enough depth	7	10	2	1	0	1
34.	The instructional media were effectively correlated with the lessons	2	0	3	13	2	1
35.	The instructional media are not an important part of the materials supplied by the American Industry Project	13	4	1	1	1	1
36.	I found that newspapers and periodicals, such as Time, had a lot of useful information for the American Industry course	0	0	4	10	6	1
37.	Discussion of local enterprises helped to bring out the concepts	0	0	0	9	11	1
38.	I need more information in the procurement concept area	2	9	4	4	1	1

		SD	D	U	A	SA	NR
39.	*The format of the lessons is functional*	0	0	1	13	5	2
40.	*My colleagues in the industrial arts department share a favorable attitude toward my American Industry courses*	3	3	7	6	1	1
41.	*The administrators in my school feel that my American Industry courses are an important part of my school's curriculum . . . .*	0	1	4	6	9	1
42.	*I had trouble completing the course on schedule*	0	1	1	7	11	1
43.	*I have received requests to make a presentation on American Industry . . .*	5	5	1	4	5	1
44.	*I had several visitors in my American Industry classes this year . . . .*	3	0	0	7	10	1
45.	*Other teachers in my school system would like to teach American Industry . . . .*	5	5	7	2	0	2
46.	*If there were other teachers of American Industry in my school system, I believe the administration would initiate all three levels of American Industry in the school curriculum . . . .*	3	1	8	3	5	1
47.	*I need more information in the communication concept area . . . .*	3	7	1	7	2	1
48.	*I need more information in the relationship concept area . . . .*	2	7	3	7	1	1
49.	*I need more information in the marketing concept area . . . .*	2	10	1	6	1	1
50.	*I had more instructional material to use this year as compared with last year .*	0	2	1	9	8	1
51.	*The Workshop helped to answer some of my questions . . . .*	1	2	1	9	7	1
52.	*The Workshops are a valuable part of my participation in the American Industry Project . . . .*	1	0	4	6	9	1
53.	*The most important part of the Workshops is the chance to talk informally with other members of the Project . .*	0	2	1	13	4	1
54.	*I appreciate the summary of events given by the Project Co-directors at the Workshops at Stout . . . .*	0	1	0	11	8	1
55.	*More time on the Workshops agenda should be given to the presentation of information and content in the concept areas . .*	1	0	7	6	6	1

		SD	D	U	A	SA	NR
56.	*The Workshop programs were too tightly scheduled*	5	7	4	3	1	1
57.	*Area workshops are helpful*	0	0	2	7	10	2
58.	*At each workshop one of the participating teachers should present a summary of what materials have worked effectively for him*	0	1	5	10	4	1
59.	*I have enough information in the resources concept area*	0	7	1	7	5	1

		SD	D	U	A	SA	NR
60.	*I need more information in the management concept area*	4	4	2	9	1	1
61.	*Overhead transparencies were more effective than the slide and filmstrip series*	0	7	10	3	0	1
62.	*Having the student activity sheets printed to facilitate duplication was a significant improvement over last year*	0	0	3	8	9	1
63.	*I need more information in the materials concept area*	3	3	2	9	3	1
64.	*I need more information in the processes concept area*	5	4	0	11	0	1

		SD	D	U	A	SA	NR
65.	*I do whatever is necessary to assure that a product or activity will be successfully completed by my students*	0	5	0	10	4	2
66.	*I need more information in the energy concept area*	3	3	2	11	1	1
67.	*Products produced in a student enterprise must be complex enough to give an observer a good impression*	5	11	3	1	0	1
68.	*The Instructor's Guide could be improved*	0	1	1	11	5	3

List ways it could be improved:

69.	*The workshops could be improved*	0	2	2	9	4	4

List ways they could be improved:

APPENDIX J

American Industry Achievement Test: Development and Analysis of Data

by

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Introduction

One of the hypothesized products of the study of American Industry in the secondary school was the development of a conceptual understanding of industry. In addition, it was thought that the students would acquire additional factual information related to industry. The American Industry Achievement Test described in the ensuing pages was designed to measure these products. It is important to note that this was only one of several measures employed to assess the end products of the study of American Industry. An essay test, several opinionnaires, and a follow-up study were also administered to determine the effects of the study of American Industry.

The ensuing section of this paper details the rationale used in designing the American Industry Achievement Test. Succeeding sections describe the design of the instrument and the validity and reliability measures employed in its development and refinement. Analysis of the results of the testing program are presented in the last section.

Rationale

Measuring knowledges and conceptual understandings involves an indirect system of measurement. In other words the researcher cannot directly observe or measure the concept, instead this must be done indirectly throught the presentation of test stimuli and the recording of responses. Only through proper structuring of the test stimuli can the use of concepts be evoked internally. After the test stimuli have been presented to the students, the evaluator must estimate from their responses the degree to which a specific concept has been utilized in responding. This set of circumstances had two implications for the construction and interpretation of the results of the American Industry Achievement Test. First, the nature of conceptual thinking and responding had to be carefully delineated. This provided the framework for developing the test items and the scoring system for the responses. Second, it meant that the test data would not exactly reflect the degree to which the responders have attained the given concepts. For, the fact that an indirect system of measurement had been employed suggested that there might be some errors or lack of precision in the test data. However, this was not as constraining a factor as might first be surmised. All measures contain some error and thus the task became one of minimizing these errors and developing test items that were as valid as possible under the constraints involved in this project.

Some basic concepts in measurement have been discussed briefly in the previous paragraphs. Another factor in the development of the achievement test was the nature of the concepts and ideas to be measured. The guidelines for this aspect of the test development came from the American Industry Project's conceptual structure of the knowledges of industry. Inherent in this structure were a selected set of concepts and the interrelationships between these concepts. (See Appendix D) In addition to this structure the Project's definition of industry also established some parameters around the area of knowledge to be assessed. Sinca the structure and the concepts had been specifically defined, a sound basis had been provided for writing a valid test. In fact, these materials greatly facilitated the development of the evaluation instruments and procedures.

The basic elements to be evaluated as products of the study of American Industry in the secondary school were the concepts which appeared in the structure and the interrelationships among these concepts. Thus, before the test instrument could be written, it was necessary to investigate the role of concepts in interpreting and responding to stimuli.

A variety of definitions of concepts have appeared in the pyschological literature. For example, Bruner (1957) viewed them as categories that are developed through experience. Utilization of a person's concepts, according to Bruner, depends upon the degree to which the stimuli agrees with the experiences encompassed in a given category. Categories tend to be homogeneous in nature and only when experiences included in a category become too heterogeneous does the category subdivide into new categories.

Staats (1961) has explained the acquisition of concepts as an S-R type of learning. According to Staats, concept labels derive meaning from the learner's experiences. Thus, experiences determine the composition and the level of sophistication of a given concept. Bruner, Goodnow, and Austin (1956, p. 244) defined a concept as "... the network of inferences that are or may be set into play by an act of categorization." These authors also felt that the possession of a given concept sensitized the person to look for the attributes of this concept in the stimuli encountered in the real world. Carner and Sheldon (1954-55, p. 226) concluded from their research that a concept could be viewed as a psychological construct which developed from experience and has some utility in the individual's thinking or responding. Burton, Kimball and Wing (1960, p. 154) suggested that a concept is detached from the central stimuli that give rise to it.

Although a variety of definitions for the term concept were encountered in the research literature there was a certain degree of similarity in the definitions. Most writers agreed that a concept permitted a person to judge a set of dissimilar objects of phenomena as equivalent on the basis of one or more defining attributes. For example, Bruner talked about the act of categorization and Burton, Kimball and Wing discussed the fact that a concept was detached from the specific stimuli that gave rise to it. Thus, one critical attribute of conceptual responding would be the ability to perceive novel stimuli as appropriate to a specific concept.

As concepts are learned they tend to develop from the physical aspects of the events and progress to a symbolic abstraction. Bruner (1964) has summarized man's attempts to comprehend the world's phenomena as a process of moving from seeing them in terms of their physical properties to a comprehension of the symbolic commonalities involved in the set of events. Therefore, it would appear that the saliency of the student's response may reflect the outcomes of the study of American Industry.

The taxonomy for the cognitive domain provided additional insights into the hierarchy of cognitive skills required to respond conceptually. On the basis of the previous discussion, conceptual behavior would fall within the third category of the cognitive domain, "application." This level in the taxonomy deals with the ability to apply knowledges previously acquired in new situations. This is parallel to the nature of the conceptual response. If the hierarchical structure of the cognitive taxonomy is valid, conceptual responses would also require that the responder have the appropriate first and second level knowledges. This implies that there are certain facts, procedures, and interpretations that will have to be utilized before one can move to conceptual responding. Thus, if it is found that a learner cannot respond appropriately to a conceptual test item the evaluator will have to determine whether the student lacks all of the facts or knowledges required or if he is unable to make the transition from the interpretation level to application.

A review of the information presented in the previous parargraphs identified several principles that are to be used in the development of the Achievement Test. First, items that were to test concepts had to involve a stimulus that would be capable of evoking the concept. Second, the stimulus had to be appropriate to the American Industry Project's conceptual structure of the knowledges of industry. Third, the test items had to contain stimuli that were novel to the responder. Fourth, test stimuli had to display various levels of saliency. Fifth, in order to diagnose problems in the attainment of concepts, items should be included in the test to determine at what level the student had acquired the knowledges of industry. This meant that the test should include some knowledge and interpretation items as well as the conceptual items.

Designing the Achievement Test

A review of the amount of time required to complete the entire set of evaluation instruments used by the project indicated that the Achievement Test should be completed in one class period. This time limit also made it feasible to have a Project staff member administer the test. Since a relatively large number of students were encompassed in the evaluation, the multiple choice format provided almost efficient means for gathering a fairly large volume of data on the cognitive outcomes of the study of American Industry.

The large number of concepts and interrelationships incorporated in the structure made it impossible to measure the attainment of each of them. Thus it was decided to measure a sample from the total set of knowledges and concepts that should have been produced by the study of American Industry. At least one item was included on each of 13 concepts on the ball of the structure and the 5 major concepts in the environmental ring. However, the number of interrelationships was very large and only a sample of these could be included. In addition, in only 6 conceptual areas was there the opportunity to include items based on levels one and two in the cognitive taxonomy. Table 1 identified the content of each of the 64 items in the Achievement Test. Content was divided into main concepts and secondary concepts. Main concepts involved the primary knowledges required to answer the question correctly. In other words, the stem and the correct response for item 1 were based on the materials concept. The secondary concepts were incorporated in the distractors in this item. The knowledge of an interrelationship was evaluated in the items where there is more than one concept listed under main concepts, such as Item 44, 51, 52, and 57. Also the knowledge of interrelationships was involved to some degree in the ability to distinquish between the secondary concepts involved in the item distractors. Table 2 gives a summary of the number of times each concept appears in primary and secondary roles in the test. Concepts on the ball of the structure were used in a primary role in from two to as many as seven items. Management, production, and research were three conceptual areas in which additional items at levels one and two in the cognitive taxonomy were included in the Achievement Test. This explains their higher frequency of appearance in a primary role. Use of the concepts in the secondary role varied from a low of one to a high of twelve. Since the environment ring contained five major concepts, the twelve listed for this area is somewhat deceiving and it actually represents slightly more than two inclusions per concept in the environmental ring. Finance was also used twelve times in a secondary role. This was mainly caused by the fact that money or financial considerations are associated to some degree with many of the activities in industry. Similarly, communication is involved in relatively large number of times in a secondary role. There appears to be a satisfactory distribution of items by concept and by role. As will be noted later, the secondary role has a greater importance than just providing distractors for items since appropriately written distractors can identify some of the misconceptions of the responders.

The general format for the conceptual multiple choice items included in the test was a stem which contained unique problem situation related to industry and a correct choice based on the Project's conceptual structure. The achievement test was designed to provide feedback information for the refinement and revision of the instructiona materials as well as to be a gauge of the final attainment of the students. Thus, a number of the items were designed to identify through the student's choice the basis for his responding incorrectly. If a wrong answer was selected the Researcher and Curriculum Specialist were able to identify the reason for his misconception. For example, one of the terms included in the test was the following:

Why would mahogany panelling be used in the office of a president of an enterprise?

A. To reduce building costs
* B. To communicate his status
C. To improve the insulation of the office
D. To strengthen the office walls

This question was a test of the student's comprehension of the relationship between communication and some of the attributes of materials. The correct answer required that the student comprehend the relationship between communication and materials. If the student focused on the salient physical qualities of materials his choice would be D and this could then be fed back into the curriculum revision process.

Two conceptual items requiring pure conceptual thinking isolated from content were included to ascertain if the conceptual study of American Industry had any carryover effect on conceptual thinking in general. These items were related to industry but the knowledge of the concepts of industry could not be directly applied to obtain the correct answers for these questions.

Test Administration Procedures

A formal set of test adminstration procedures were developed by the Research Specialist and used for each administration of the Achievement Test. The administration procedures contained two sections. The first dealt with the preparation required before the class arrived and the second section included the directions to be read to the students and the instructions to the test administrator for the observation and control activities to be employed during the test period.

These instructions were rather detailed and were piloted by the Research Specialist during several of the pretesting sessions in the initial year of the evaluation period. Slight revisions were made and then additional copies of the instructions were printed and placed in 8½ x 11 binders. The Research Specialist, other Project staff members, and guidance counselors in the participating schools used these instructions during the three years the achievement test was administered. No specific weaknesses were noted in these procedures.

Since the testing period consisted of two timed sections in the Achievement Test and a separate essay section, a timing sheet was designed to assist the test administrator in keeping on schedule. This sheet also included a place to note any problems that occurred during the test period and allowed for feedback of any oddities that might have transpired in the testing. Review of these forms revealed no events that would invalidate the test data.

During the three years the Achievement Test was used, several different procedures were utilized to administer it to the American Industry and control group students. During the first year, the Research Specialist and other Project staff members administered all of the tests. After the first year, a reduction in the Project's budget required that the travel of the staff be restricted. As a result the Research Specialist had to turn to the guidance counselors and participating teachers to administer the test. Some question might be raised concerning the use of the participating teachers to administer the test. However, the data were available from the previous year and comparisons between the first year and the last two years indicated that there were no irregularities. In addition, the tests were sent to the principal of the schools involved about two weeks before they were to be administered. On the day of the test the participating teacher would obtain the test materials from his principal, administer them, and return the completed answer sheets and the test booklets to the principal before the close of the school day. This procedure worked satsifactorily and did not appear to result in teaching of a test.

Validity and Reliability

Content Validity

In the section on designing the Achievement Test, the basis for sampling the concepts and interrelationships to be measured was defined. In addition, Tables 1 and 2 present summary data on the concept areas tested by each of the Achievement Test items and the distribution of test items by concept. The distribution of test items appears to be appropriate.

As additional consideration in the area of content validity is the type of knowledge measured by the test items. In other words, the test items must require conceptual behavior to define the correct response in order to be valid. As noted in the section describing the design of the Achievement Test, Bloom's Taxonomy for the Cognitive Domain was used to identify the level at which each Achievement Test item was functioning. Table 3 presents the taxonomy level of each of the test items in the Achievement Test. A review of Table 3 indicates that an adequate number of level three items or higher in the taxonomy were present to assess the conceptual knowledges of the students. Care was taken in writing the test items to use a vocabulary and sentence structure appropriate to eighth grade students.

TABLE I
Content Analysis of American Industry Achievement Test

Section I:

Item	*Main Concept*	*Secondary Concepts*
1	*Material*	*Processes, Procurement, Production.*
2	*Production*	*Finance, Resources.*
3	*Communication*	*(Feedback)*
4	*Property*	*Materials, Procurement.*
5	*Processes*	*Conceptual.*
6	*Transportation*	*Marketing, Finance, Competition.*
7	*Production*	*Finance, Resources, Management.*
8	*Productivity*	*Compeition.*
9	*Knowledge of A.I. Structure*	
10	*Finance*	
11	*Productivity*	*Finance, Resources, Management (plan)*
12	*Environment*	
13	*Relationships*	
14	*Management*	*Communication, Production.*
15	*Competition*	*Profit(Finance).*
16	*Marketing*	*Research, Need, Competition.*
17	*Research*	*Finance, Communication.*
18	*Management*	*Relations to Entire Enterprise--Production, Procurement, Marketing.*
19	*Procurement*	*Materials, Transportation, Need.*
20	*Energy*	*Relationships.*
21	*Relationships*	*Research*
22	*Production*	
23	*Research*	*Marketing.*
24	*Marketing*	*Communications.*
25	*Procurement*	*Materials.*
26	*Processes*	*Communication.*
27	*Materials*	*Finance.*
28	*Energy*	*Conceptual.*
29	*Transportation*	*Energy.*
30	*Management*	
31	*Transportation*	*Energy.*
32	*Conceptual*	*Relationships, Procurement.*

Section II:

33	*Transportation*	*Finance*
34	*Relationships*	
35	*Research*	

TABLE I (Continued)

Item	Main Concept	Secondary Concepts
36	Relationships	Materials, Communication, Finance.
37	Procurement	Transportation, Finance
38	Definition of Industry	Productivity
39	Finance	
40	Management	Marketing
41	Future	Productivity, Environment, Definition of A. I.
42	Conceptual	
43	Production	Finance.
44	Processes--Materials	Procurement, Transportation.
45	Research	
46	Processes	Finance, Energy.
47	Management	Relationships, Finance.
48	Finance	
49	Production	Resources
50	Environment	
51	Management--Production	Communication.
52	Management--Production	Communication.
53	Communication	
54	Property	Materials.
55	Research	
56	Materials	Definition of Industry.
57	Future--History	Relationships.
58	Marketing	Communication.
59	Processes	Communication, Environment.
60	Energy	Transportation, Finance, Environment.
61	Property	Processes, Production, Management Environment.
62	Energy	
63	Finance	
64	Marketing	

TABLE 2

Frequency of Appearance of Concepts in the Achievement Test

Concept	Section I 1 - 32		Section II 33 - 64		Total	
	Primary	Secondary	Primary	Secondary	Primary	Secondary
Communication	1	5	1	5	2	10
Transportation	2	3	2	3	4	6
Finance	3	10	1	2	4	12
Property	1	1	2	0	3	1
Research	3	1	3	0	6	1
Procurement	2	4	1	1	3	5
Relationships	3	2	1	1	4	3
Marketing	2	2	2	2	4	4
Management	6	3	1	1	7	4
Production	6	2	1	2	7	4
Materials	2	3	2	2	4	5
Processes	3	1	2	2	5	3
Energy	1	1	3	2	4	3
Environment	3	9		3	3	12
Conceptual (pure)	1	1	1	1	2	2
Productivity	2	2			2	2
Definition of A.I.	1	4			1	4
Structure	1				1	
Future	1				1	

TABLE 3

Summary of the Cognitive Taxonomy Levels and Concept Areas in the American Industry Achievement Test

	Cognitive Taxonomy Levels					
Concepts	*1*	*2*	*3*	*4*	*5*	*6*
Communication			*3*			
Transportation			*3*	*1*		
Finance	*1*	*1*	*2*			
Property		*1*	*2*			
Research	*2*	*2*	*2*			
Procurement			*2*			
Relationships			*4*			
Marketing			*2*	*1*		
Management	*2*	*2*	*3*			
Production	*1*	*1*	*2*	*1*		
Materials	*1*		*2*			
Processes			*4*			
Energy			*4*			
Environment			*3*			
Conceptual			*2*			
Productivity			*2*			
Definition A.I.			*1*			
Structure	*1*		*1*			
Future			*1*		*1*	
TOTAL	*8*	*7*	*45*	*3*	*1*	

The contents of the Achievement Test were reviewed by other members on the Project and were judged to be valid.

Reliability

Table 4 reports the low median, and high reliabilities obtained from the administration of the Achievement Test. These reliabilities were calculated by means of Hoyt's ANOVA. Median reliabilities for grades 8 and above exceed .80. While not as high as the reliabilities of most standarized tests, the reliability of the Achievement Test was adequate for the purposes of the evaluation. Also, it should be noted that the problem type items included in the test tend to reduce test reliability.

Median reliabilities increased with the age of the responders and the range of reliabilities obtained decreased with age. Both of these phenomena would be expected if the Achievement Test was accurately measuring the student's conceptual knowledge of kndustry.

In summary, the Achievement Test was found to be content valid and reliable. The reliabilities obtained for grade 7 were low; however, the test was designed for grade 8 and above. Thus, these results were not unexpected for grade 7.

Reactivity of Presting

Pretests were administered whenever students could not be randomly assigned to groups. To check the reactivity of pretesting, a Solomon four-group design was used in two schools during the 1965-66 school year. In these schools two pretest instruments were employed. One was the Project's Achievement Test. The second test was based on traditional industrial arts content. Prior to the test period the two test forms were collated in alternating order - Achievement Test, traditional test, Achievement Test, etc. - into one stack. Tests were distributed in consecutive order from this stack at the start of the test period.

Analysis of the post-test scores for the students in American Industry and the control groups revealed no statistically significant increase in test scores resulting from exposure to the pretest. The outcomes of the one-way analysis of variance comparisons are given in Table 5. (Ability strata were not included in the analysis because of the small and unequal numbers in each of the resulting cells.) None of the F values were significant, thus, pretesting did not cause any significant change in performance on the post-test. On the basis of these results, it was concluded that pretesting could be conducted without the placebo. Administering the Achievement Test to all students in the control and American Industry groups at the beginning of the course provided a larger N for use in analysis of covariance.

Results of Comparisons of Achievement Test Performance

Analyses of the achievement results are presented for each school in the following pages. A summary of these results is given in Table 6 which follows immediately after this page. This

TABLE 4
Reliability of the American Industry Achievement Test

Grade Level	Number	Reliability Low	Reliability Median	Reliability High
7	7	.66	.68	.70
8	24	.59	.81	.90
9	14	.58	.84	.88
10, 11, & 12	28	.76	.85	.91

TABLE 5

Solomon Four - Group Analyses

School L

American Industry

Source	*d.f.*	*SS*	*MS*	*F*	
Pretesting	*1*	*11.49*	*11.49*	*.13*	*N.S.*
Error	*24*	*2025.12*	*84.38*		
TOTAL	*25*	*2036.61*			

Control Groups

Source	*d.f.*	*SS*	*MS*	*F*	
Pretesting	*1*	*6.53*	*6.53*	*.08*	*N.S.*
Error	*28*	*2324.67*	*83.02*		
TOTAL	*29*	*2331.20*			

School M

American Industry

Source	*d.f.*	*SS*	*MS*	*F*	
Pretesting	*1*	*.83*	*.83*	*.019*	*N.S.*
Error	*18*	*782.92*	*43.49*		
TOTAL	*19*	*783.75*			

Control Group

Source	*d.f.*	*SS*	*MS*	*F*	
Pretesting	*1*	*39.67*	*39.67*	*.75*	*N.S.*
Error	*18*	*948.13*	*52.67*		
TOTAL	*19*	*948.8*			

TABLE 6

Summary of Comparisons
on A.I. Achievement Test for Level I

Level I

Degree to which Instructor's Guide used	Length of Course	1966-67			1967-68			1968-69			Totals		
		S.D.	.10-.05	N.S.D.	S.D.	.10-.05	N.S.D.	S.D.	.10-.05	N.S.D.	S.D.	.10-.05	N.S.D.
High	Yr.	3	-	4	3	1	1	1	1	1	7	2	6
	Sem	3,[a]	4	5	2	-	9	5,[b]	-	3	10.[b][a]	4	17
Low	Yr.	-	-	1	-	-	1	-	-	-	0	0	2
	Sem	-	-	3	-	-	3	-	-	1	0	0	7
TOTAL		6,[a]	4	13	5	1	14	6,[b]	1	5	17,[b][a]	6	32

a disordinal interaction
b significant gain scores

table summarizes the outcomes of the comparisons made between American Industry (experimental) and control groups on the Project's Achievement Test. The difference in performance between those in semester and year programs and the difference associated the degree to which the instructor's guide was followed are indicated in the table. Programs which were a year in length produced proportionately more significant differences than those which were a semester long. None of the teachers who did not follow the guide had American Industry classes that performed signifcantly better than control groups on the achievement test. During 1967-68, the impacts of major revisions in the instructional materials can be observed. For this year the instructor's guide was completely revised and new media was developed. The long range results, however, can be seen in the improved performance in 1968-69.

The results of comparisons within school are presented after Table 6. Each school is identified by an upper case letter. These letter labels were randomly assigned to the schools. The year, length of program, and level of the American Industry course(s) involved are also listed. In the analysis of variance tables the ability component is based on high, middle, and low groupings with ± ½ standard deviation (from the test norms) bounding the middle group. When only two ability groups are included in a table (1 d.f. for ability) the two levels represented are usually the high and middle groups. Review of the ability data presented in the concluding section of this report will indicate whether high and middle or low and middle ability groups are encompased in the analysis. Special analyses are footnoted in the tables.

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School A
Level I
Year: 1968-69, Semester I

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	756.53	2	378.26	10.58	< .01	A.I.
Ability	618.14	1	618.14	17.29	.01	High
TXA	127.01	2	63.50	1.78	N.S.	
Among Subclasses	1501.69	5	300.33	8.40		
Within Subclasses	1965.93	55	35.74			
Total	4969.31	60				

Level I
Year: 1968-9, Semester II

Source Vaiation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	77.78	2	38.89	.78	N.S.	
Error	2490.97	50	49.82			
Total	2568.75	52				

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School B
Level I - Grade 9
Year: 1966-7, Semester I

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	46.28	1	46.28	1.12	N.S.	-
Ability	371.57	1	371.57	8.97	<.01	High
T X A	89.28	1	89.28	2.15	N.S.	-
Error	994.28	24	41.42	-	-	
TOTAL	1501.42	27				

Level I - Grade 9
Year: 1966-7, Semester II

Source Variation	S.S.	D.F.	M.S.	F	q P	Favors
Treatments	6.03	1	6.03	.12	-	-
Ability	336.03	1	336.03	6.55	<.05	High
T X A	8.03	1	8.03	.16	-	-
Error	1232.00	24	51.33	-	-	-
TOTAL	1582.10	27				

School B
Level I - 9th Grade
Year: 1967-8, Semester I

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	6.00	1	6.00	.23	N.S.	-
Ability	181.50	1	181.50	7.01	$<.05$	High
T X A	0.00	1	0.00	.00	-	-
Error	518.33	20	25.91	-	-	-
TOTAL	705.83	23				

Level I - 9th Grade
Year: 1967-8, Semester II

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	1.04	1	1.04	.03	N.S.	-
Ability	301.04	1	301.04	8.99	$<.01$	High
T X A	3.37	1	3.37	.10	-	-
Error	669.50	20	33.47	-	-	-
TOTAL	974.95	23				

School B
Level I - 9th Grade
Year: 1968-9, Semester I

Source Variation [c]	S.S.	D.F.	M.S.	F	P	Favors
Treatments	77.59	1	77.59	2.28	N.S.	
Ability	200.23	2	100.12	2.95	N.S.	
T X A	98.61	2	49.31	1.45	N.S.	
Among Subclasses	376.44	5	75.29	2.22	N.S.	
Within Subclasses	883.18	26	33.97			
Total	1636.06	31				

Level I - 9th Grade
Year: 1968-9, Semester II

Source Variation [c]	S.S.	D.F.	M.S.	F	P	Favors
Treatments	67.51	1	67.51	1.90	N.S.	
Ability	212.59	2	106.29	2.99	N.S.	
T X A	99.96	2	49.98	1.41	N.S.	
Among Subclasses	408.14	5	81.63	2.29	N.S.	
Withing Subclasses	925.15	26	35.58			
Total	1713.35	31				

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[c] Unweighted means method used for unequal frequencies.

School B
Level I - 10th Grade
Year: 1966-7, Semester I

Source Variation	S.S.	D.F.	M.S.	F.	P.	Favors
Treatments	140.08	1	140.08	3.73	$.10 > F > .05$	A.I.
Ability	987.79	2	489.39	13.04	$< .01$	High
T X A	157.29	2	78.64	2.10	N.S.	
Error	1576.50	42	37.53			
Total	2852.66	47				

Level I - 10th Grade
Year: 1966-7, Semester II

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	143.52	1	143.52	3.80	$.10 > F \geq .05$	A.I.
Ability	1285.29	2	642.64	17.02	$\leq .01$	High
T X A	493.79	2	246.89	6.54	$\leq .01$	disordinal[a]
Error	1585.87	42	37.75			
Total	3508.47	47				

[a] Disordinal interaction between high and middle ability groups. The middle ability group in A.I. during second semester scored significantly better than the middle ability in the control group which had A.I. during the first semester. The status in the comparison between high ability groups was reversed. Note, the tendency toward significant differences between treatments was caused by the interaction.

School B
Level I - 10th Grade
Year: 1967-8, Semester I

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*50.10*	*1*	*50.10*	*1.11*	*N.S.*	-
Ability	*250.48*	*1*	*250.48*	*5.57*	*<.05*	*High*
T X A	*94.83*	*1*	*94.83*	*2.11*	*N.S.*	-
Error	*989.05*	*22*	*44.95*	-		
TOTAL	*1384.46*	*25*				

Level I - 10th Grade
Year: 1967-8, Semester II

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*17.06*	*1*	*17.06*	*.594*	*N.S.*	-
Ability	*562.49*	*1*	*562.49*	*19.58*	*<.05*	*High*
T X A	*244.765*	*1*	*244.77*	*8.52*[b]	*<.01*	*disordinal* [b]
Error	*718.39*	*25*	*28.74*			
TOTAL	*1542.71*	*28*				

[b] *Disordinal interaction between high and middle ability groups. High ability A.I. second semester was significantly better than the high ability students in the control group. The positions were reversed for the middle ability groups.*

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School C
Level I
Year: 1966-7

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*408.44*	*3*	*136.14*	*2.56*	*N.S.*	-
Ability	*1120.22*	*1*	*1120.22*	*21.06*	*<.01*	*High*
T X A	*55.33*	*3*	*18.44*	*.35*	*N.S.*	-
Error	*3404.44*	*64*	*53.19*			
TOTAL	*4988.44*	*71*				

Level I
Year 1967-8, Semester I

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*60.31*	*1*	*60.31*	*.80*	*N.S.*	-
Ability	*288.34*	*1*	*288.34*	*3.84*	*N.S.*	-
T X A	*48.76*	*1*	*48.76*	*.65*	*N.S.*	–
Error	*2703.64*	*36*	*75.10*			-
TOTAL	*3101.05*	*39*				

School C
Level I
Year: 1967-8, Semester II

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	75.18	1	75.18	.88	N.S.	-
Ability	299.87	1	299.87	3.49	N.S.	-
T X A	58.75	1	58.75	.69	N.S.	-
Error	2917.72	34	85.82			
TOTAL	3351.52	37				

Level I
Year 1968-9, Semester I

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	130.02	1	130.02	4.11	.05	A.I.
Ability	1958.62	2	979.31	30.97	.01	High
T X A	84.29	2	42.14	1.33	N.S.	
Error	1328.37	42	31.62			
Total	3501.31	47				

Level I
Year 1968-9, Semester II

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	99.18	1	99.18	1.45	N.S.	-
Ability	1704.04	2	852.02	12.48	<.01	High
T X A	50.37	2	25.18	.37	N.S.	-
Error	2868.37	42	68.29			
TOTAL	4721.97	47				

Useing analysis of covariance with the achievement test scores at the end of semester I as the covariate:

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	548.05	1	548.05	15.37	<.01	A.I.
Error	1604.11	45	35.65	—		
TOTAL	2152.16	46				

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School D
Level I
Year: 1966-7. Semester I

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*239.44*	*3*	*79.81*	*2.52*	*.10 > F > .05*	*A.I.*
Ability	*168.05*	*1*	*168.05*	*4.74*	*< .01*	*High*
T X A	*159.38*	*3*	*53.12*	*1.50*	*N.S.*	-
Error	*2267.55*	*64*	*35.43*	-		
TOTAL	*2834.44*	*71*				

Level I
Year: 1966-7. Semester II

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*116.03*	*2*	*58.01*	*1.03*	*N.S.*	-
Ability	*208.07*	*1*	*208.07*	*3.68*	*<05*	*High*
T X A	*20.48*	*2*	*10.24*	*.18*	*N.S.*	-
Error	*2715.55*	*48*	*56.57*	-		
TOTAL	*3060.14*	*53*				

Level I
Year: 1967-8, Semester I

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*56.53*	*1*	*56.53*	*1.51*	*N.S.*	-
Ability	*345.65*	*2*	*172.65*	*4.63*	$<.05$	*High*
T X A	*17.66*	*2*	*8.83*	*.24*	*N.S.*	-
Error	*895.63*	*24*	*37.32*			
TOTAL	*1315.47*	*29*				

Level I
Year: 1967-8, Semester II

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*20.54*	*1*	*20.54*	*.72*	*N.S.*	-
Ability	*311.54*	*2*	*155.77*	*5.50*	$<.05$	*High*
T X A	*30.16*	*2*	*15.08*	*.53*	*N.S.*	-
Error	*679.93*	*24*	*28.33*			
TOTAL	*1042.17*	*29*				

Level I
Year: 1968-9. Semester I

Source Variation [a]	S.S.	D.F.	M.S.	F	P	Favors
Treatments	458.76	3	152.92	5.63	$<.01$	A.I.
Ability	1680.28	2	840.14	30.91	$<.01$	High
Interaction	258.10	6	43.02	1.58	N.S.	-
Among Subclasses	2397.15	11	217.92	8.02		
Within Subclasses	2364.57	82	27.18	-		
TOTAL	7158.86	93				

[a] Unweighted Means used for analysis

Level II
Year: 1968-9. Semester I

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	173.36	1	173.36	4.32	$<.05$	A.I.
Ability	318.02	1	318.02	7.93	$<.01$	High
T X A	90.25	1	90.25	2.51	N.S.	
Error	1283.11	32	40.09			
TOTAL	1864.75	35				

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School E
Level I - 9th Grade
Year: 1966-7

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	37.00	2	18.50	.51	N.S.	-
Ability	493.71	1	493.71	13.52	$<.01$	High
T X A	113.28	2	56.64	1.55	N.S.	-
Error	1315.14	36	36.53			
TOTAL	1959.14	41				

Level I - 9th Grade
Year: 1967-8

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	63.00	1	63.00	1.14	N.S.	-
Ability	386.28	1	386.28	6.98	$<.05$	High
T X A	17.28	1	17.28	.31	N.S.	-
Error	1328.28	24	55.34			
TOTAL	1794.85	27				

Level I - 9th Grade
Year: 1968-9

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	343.00	2	171.50	4.68	< .05	A.I.
Ability	1570.33	2	785.16	21.41	<.01	High
T X A	162.66	4	40.66	1.11	N.S	-
Error	1650.61	45	36.68	-	-	-
TOTAL	3726.60	53	-			

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School F
Level I - Grades 10 and above
Year: 1966-7

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*3.57*	*1*	*3.57*	*.06*	*N.S.*	-
Within	*2505.40*	*40*	*62.64*	-	-	-
TOTAL	*2508.97*	*41*				

Level II - Grades 11 and 12
Year: 1666-7

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatment	*225.74*	*1*	*225.74*	*4.20*	$< .05$	*A.I.*
Within	*2147.90*	*40*	*53.70*	-	-	-
TOTAL	*2373.643*	*41*				

Level II - Grades 11 and 12
Year : 1967-68

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	144.00	1	144.00	3.70	$.10 > F > .05$	A.I.
Ability	636.50	2	318.25	8.17		High
T X A	106.16	2	53.08	1.36	N.S.	
Error	1168.33	30	38.94			
Total	2055.00	35				

Level II - Grades 11 and 12
Year: 1968-69

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	62.48	1	62.48	1.88	N.S.	
Ability	939.25	1	939.25		<.01	High
T X A	20.94	1	20.94		N.S.	
Error	1596.76	48	33.26			
Total	2619.44	51				

School G
No control groups available.

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School H
Level I
Year: 1966-7, Semester I

Source Variation [a]	S.S.	D.F.	M.S.	F	P	Favors
Treatments	918.94	3	306.31	8.16	< .01	A.I.
Ability	1162.57	2	581.29	15.49	< .01	High
Interaction	34.09	6	5.68	.15	N.S.	-
Among Subclasses	2115.60	11	192.23	5.124		
Within Subclasses	2363.49	63	37.52	-		
TOTAL	4479.09	74				

Level I - Grades 10 and above
Year: 1966-7, Semester II

Source Variation [b]	S.S.	D.F.	M.S.	F	P	Favors
Treatments	634.64	1	634.64	19.99	< .01	A.I.
Error	888.94	28	31.75			
TOTAL	1523.58	29				

a Unwieghted means ANOVA
b Analysis of Covariance with pretest scores on the achievement test used as the covariate.

Level I - Grades 10 and above
Year: 1967-8, Semester I

Source Variation [a]	S.S.	D.F.	M.S.	F	P	Favors
Treatments	267.31	2	133.65	3.55	< .05	A.I.
Ability	4022.22	2	2011.11	53.46	< .01	High
Interaction	111.72	4	27.93	.74	N.S.	
Among Subclasses	4401.25	8	550.16	14.62	.01	
Within Subclasses	1843.22	49	37.62			
Total	6244.47	57				

Level I - Grades 10 and above
Year: 1967-8, Semester II

Source Variation [b]	S.S.	D.F.	M.S.	F	P	Favors
Treatments	1075.86	2	537.93	20.84	< .01	A.I.
Error	1290.46	48	25.81			
Total	2366.32	50				

a Unweighted means ANOVA

b Analysis of covariance with pretest scores on the achievement test used as the covariate.

School H - 1968-9

Level I - Grades 10 and above

A.I. Class I: $\bar{d} = 10.07$

$t_d = 7.11$

d.f. = 14

$P < .001$

A.I. Class II: $\bar{d} = 4.8$

$t_d = 3.79$

d.f 14

$P < .01$

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School I
Level I
Year: 1967-68

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	1090.45	3	363 48	11.40	< .01	A.I.
Ability	1264.05	1	1264.05	39.65	< .01	High
T X A	44.85	3	14.95	.47	N.S.	—
Error	2295.39	72	31.88			
TOTAL	4694.74	79				

Level-Comparison of 1 class 9th grade boys vs. 2 classes of 8th grade boys. All three groups had American Industry. Treatments were the grade differences.

Year: 1968-69

Source Variation	S.S.	D.F.	M.S.	F	p	Favors
Treatments	62.72	2	31.36	.45	–	–
Ability	1792.11	1	1792.11	25.5	< .01	High
T X A	375.72	2	187.86	2.73	N.S.	
Error	2109.00	30	70.29			
TOTAL	4339.55	35				

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School J – No control groups available.

School K
Level I – 7th Grade
Year: 1966-67

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*39.54*	*1*	*39.54*	*1.71*	*N.S.*	–
Ability	*161.84*	*2*	*80.92*	*3.5*	*.05*	*High*
T X A	*46.70*	*2*	*23.35*	*1.01*	*N.S.*	–
Error	*2034.56*	*88*	*23.12*			
Total	*2282.64*	*93*				

Level I – 7th Grade
Year: 1966-67, Semester II

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*21*	*1*		*1.05*	*N.S.*	
Ability	*93.60*	*2*		*2.34*	*N.S.*	
T X A	*35.60*	*2*		*.89*	*N.S.*	
Error	*2040.00*	*102*				
Total	*2190.20*	*107*				

Level II - 8th Grade
Year: 1967-8, Semester I

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	44.18	1	44.18	1.88	N.S.	
Ability	90.72	2	45.36	1.93	N.S.	
T X A	30.56	2	15.28	.65	N.S.	
Error	2397.00	102	23.50			
Total	2562.46	107				

Level II - 8th Grade
Year: 1967-8, Semester II

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	22.52	1	22.52	.87	N.S.	
Ability	107.70	2	53.85	2.08	N.S.	
T X A	49.20	2	24.60	.95	N.S.	
Error	2563.11	99	25.89			
Total	2742.53	104				

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School L
Level I
Year: 1966-7[a]

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatment	248.35	1	248.35	7.87	$<.01$	A.I
Error	1293.94	41	31.56			
TOTAL	1542.29	42				

Group	Pretest $\overline{X}$	Post test $\overline{X}$	I.Q. $\overline{X}$
A. I.	22.6	29.3	101.2
Control	26.2	28.4	107.

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[a] Quasi experimental design - Analysis of Covariance used

Level I
Year: 1967-8 - *No control group available post test results:*
$\overline{X}$ = *29.07. Subjects were similar to the students enrolled in the prior year. I. Q. :* $\overline{X} = 103.0$

Level I
Year: 1968-9

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatments	120.14	1	120.14	3.30	$.10 > F > .05$	A.I.
Ability	175.00	1	175.00	4.81	.05	High
T X A	0.57	1	0.57	.02	N.S.	-
Error	873.14	24	36.38			
TOTAL	1168.85	27				

School M
Level I
Year: 1966-7

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

Source Variation	S. S.	D.F.	M.S.	F	P	Favors
Treatment	403.22	1	403.22	11.53	< .01	A.I.
Ability	511.22	1	511.22	14.62	< .01	High
T X A	1.22	1	1.22	.04	N.S.	-
Error	1259.09	36	34.97			
TOTAL	2174.77	39				

Level I
Year: 1967-8

Source Variation	S.S.	D.F.	M.S.	F	P	Favors
Treatment	608.44	1	608.44	15.44	< .01	A.I.
Ability	361.00	1	361.00	9.6	< .01	High
T X A	69.44	1	69.44	1.76	N.S.	-
Error	1261.11	32	39.40			
TOTAL	2300.00	35				

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School N
Level I
Year: 1967-8, Semester II

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*8.10*	*1*	*8.10*	*.24*	*N.S.*	-
Ability	*144.40*	*1*	*144.40*	*4.25*	$<.05$	*High*
T X A	*122.50*	*1*	*122.50*	*3.61*	$.10>F>.05$	*A.I. middle ability group*
Error	*1221.40*	*36*	*33.92*			-
TOTAL	*1496.40*	*39*				

School O
Level I: Grades 9 and above
Year: 1966-7

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*65.72*	*1*	*65.72*	*.82*	*N.S.*	
Error	*3366.30*	*42*	*80.15*			
Total	*3432.02*	*43*				

Level II: Grades 10 and above
Year: 1967-8

Source Variation	*S. S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*18.75*	*1*	*18.75*	*.22*	*N.S.*	
Error	*2556.90*	*30*	*85.23*			
Total	*2575.65*	*31*				

COMPARISON OF AMERICAN INDUSTRY AND CONTROL GROUP STUDENTS ON THE ACHIEVEMENT TEST

School P
Level I
Year: 1966-7

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*168.15*	*1*	*168.15*	*2.37*	*$.20 > F > .10$*	-
Within	*2200.00*	*31*	*70.97*			
TOTAL	*2368.15*	*32*				

Level I
Year: 1967-8

Source Variation	*S.S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatment	*689.26*	*1*	*689.26*	*9.73*	*$< .001$*	*A.I.*
Within	*2550.*	*36*	*70.83*			
TOTAL	*3239.26*	*37*				

School R
Level I: Grades 10 and above
Year: 1966-7

Source Variation	*S. S.*	*D.F.*	*M.S.*	*F*	*P*	*Favors*
Treatments	*108.97*	*1*	*108.97*	*1.80*	*N.S.*	
Error	*2239.98*	*37*	*60.54*			
Total	*2348.95*	*38*				

School A
Level I
Year: 1968-9

ABILITY LEVELS FOR AMERICAN INDUSTRY AND CONTROL GROUPS

Ability Paramenters	A.I.		Control	
	g1	g2	g1	g2
$\overline{X}$	114.1	118.4 [a]	118.4 [a]	112.6
S.D.	7.4	11.6	11.6	9.1
N	23	21	21	15

School B
Level I
Year: 1966-7

Ability Paramenters	A.I.				Control	
	g1	g2	g3	g4	g1	g2
$\overline{X}$	101.4	102.6[a]	109.3	107.3 [a]	107.3 [a]	102.6 [a]
S.D.	12.3	9.1	9.3	5.7	5.7	9.1
N	20	18	13	14	14	18

Year: 1967-8

Ability Paramenters	A.I.			Control
	g1	g2	g3	g1
$\overline{X}$	103.5	104.1	108.6	105.4
S.D.	10.8	7.4	6.4	10.5
N	18	12	12	19

[a] Rotational design, first semester contrasts listed.

Year: 1968-9

Ability Parameters	A.I.	Control
	g1	g1
$\bar{X}$	103.4 [a]	102.1 [a]
S.D.	10.1	9.8
N	20	21

School C
Level I
Year: 1966-7

Ability Parameters	A.I.			Control		
	g1	g2	g3	g1	g2	g3
$\bar{X}$	108.1	110.7	112.1	112.1	108.3	108.5
S.D.	12.8	11.0	14.3	13.1	10.6	9.7
N	18	16	22	18	18	22

Year: 1967-8

Ability Parameters	A.I.		Control	
	g1	g2	g1	g2
$\bar{X}$	90.8 [a]	91.3 [a]	91.3 [a]	90.8 [a]
S.D.	8.4	11.1	11.1	8.4
N	20	20	20	20

[a] Rotational design

Year: 1968-9

Ability Parameters	*A.I.*		*Control*	
	g1	*g2*	*g1*	*g2*
$\bar{X}$	*101.5* [a]	*102.7* [a]	*102.7* [a]	*101.5* [a]
S.D.	*10.8*	*13.7*	*13.7*	*10.8*
N	*21*	*21*	*21*	*21*

School D
Level I
Year: 1966-7

Ability Parameters	*A.I.*		*Control*		
	g1	*g2*	*g1*	*g2*	*g3*
$\bar{X}$	*107.4*	*110.1* [a]	*106.7*	*110.1* [a]	*108.3*
S.D.	*8.0*	*9.5*	*7.2*	*9.5*	*8.7*
N	*18*	*18*	*18*	*18*	*18*

Year: 1967-8

Ability Parameters	*A.I.*			*Control*	
	g1	*g2*	*g3*	*g2*	*g3*
$\bar{X}$	*101.1*	*108.5* [a]	*97.3* [a]	*108.5* [a]	*97.3* [a]
S.D.	*12.4*	*14.6*	*14.0*	*14.6*	*14.0*
N	*17*	*20*	*23*	*20*	*23*

[a] *Rotational design*

Year: 1968-9

Ability Parameters	A.I.			Control
	g1	g2	g3	g1
$\bar{X}$	97.7	101.3	102.1	102.8
S.D.	9.8	10.5	9.7	11.1
N	23	20	22	25

Level II
Year: 1968-9

Ability Parameters	A.I.	Control
	g1	g1
$\bar{X}$	104.3	105.4
S.D.	6.2	6.6
N	18	18

School E
Level I
Year: 1966-7

Ability Parameters	A.I.				Control	
	g1	g2	g3	g4	g1	g2
$\bar{X}$	276.9 [b]	275.0	28.5	284.7	266.2	283.8
S.D.	8.1	9.0	8.8	8.8	10.8	8.8
N	14	14	15	15	14	12

[b] *STEP scores*

Year: 1967-8

Ability Parameters	*A.I.*	*Control*
$\bar{X}$	*gl* *106.7*	*gl* *117.0*
S.D.	*9.5*	*15.0*
N	*12*	*14*

Year: 1968-9

Ability Parameters	*A.I.*	*Control*
$\bar{X}$	*gl* *98.1*	*gl* *99.8*
S. D.	*12.7*	*12.2*
N	*35*	*23*

School F
Level II
Year: 1966-7

Ability Parameters	*A.I.*	*Control*
$\bar{X}$	*gl* *269.7* [b]	*gl* *270.3*
S.D.	*10.8*	*10.3*
N	*23*	*19*

[b] *STEP Scores*

Year: 1967-8

Ability Parameters	A.I.			Control
	g1	g2	g3	g1
$\overline{X}$	267.6 [b]	275.8	270.3	272.1
S.D.	11.1	11.1	9.3	13.4
N	17	13	8	18

[b] STEP Scores

Year: 1968-9

Ability Parameters	A.I.	Control
	g1	g1
$\overline{X}$	107.0	106.2
S.D.	9.9	6.7
N	26	26

School H
Level I
Year: 1966-7

Ability Parameters	A.I.			Control	
	g1	g2	g3	g1	g2
$\overline{X}$	99.7	104.2	102.6	102.6 [a]	105.4
S.D.	9.7	10.1	10.1	10.1	8.8
N	21	20	20	20	20

[a] Rotational design

Year: 1967-8

Ability Parameters	*A.I.*			*Control*		
	g1	*g2*	*g3*	*g1*	*g2*	*g3*
$\bar{X}$	*103.1*[a]	*98.8*[a]	*99.0*[a]	*99.0*[a]	*103.1*[a]	*98.8*[a]
S.D.	*10.6*	*8.1*	*8.1*	*8.1*	*10.6*	*8.1*
N	*22*	*18*	*23*	*23*	*22*	*18*

Year: 1968-9

Ability Parameters	*A.I.*		*Control*
	g1	*g2*	
$\bar{X}$	*102.4*	*108.0*	
S.D.	*7.0*	*12.9*	
N	*15*	*15*	

School I
Level I
Year: 1967-8

Ability Parameters	*A.I.*		*Control*	
	g1	*g2*	*g1*	*g2*
$\bar{X}$	*285.1*[b]	*281.6*[b]	*281.1*[b]	*276.5*[b]
S.D.	*9.6*	*8.6*	*9.2*	*8.9*
N	*20*	*20*	*19*	*19*

Year: 1968-9

Ability Parameters	*A.I.*			*Control*
	g1	*g2*	*g3*	
$\bar{X}$	*280.8*[b]	*280.1*[b]	*278.0*[b]	
S.D.	*11.9*	*10.9*	*6.7*	
N	*12*	*11*	*12*	

a Rotational design
b STEP Scores

School K
Level I
Year: 1966-7

Ability Parameters	*A.I.*		*Control*	
	g1	*g2*	*g1*	*g2*
$\overline{X}$	*101.4* [a]	*101.2* [a]	*101.2* [a]	*101.4* [a]
S.D.	*9.9*	*10.1*	*10.1*	*9.9*
N	*50*	*51*	*51*	*50*

Level II
Year: 1967-8

Ability Parameters	*A.I.*		*Control*	
	g1	*g2*	*g1*	*g2*
$\overline{X}$	*101.6* [a]	*101.8* [a]	*101.6* [a]	*101.8* [a]
S.D.	*10.0*	*10.3*	*10.0*	*10.3*
N	*49*	*52*	*49*	*52*

School L
Level I
Year: 1966-7

Ability Parameters	*A.I.*	*Control*
	g1	*g1*
$\overline{X}$	*101.2* [c]	*107.0* [c]
S.D.	*11.3*	*13.1*
N	*25*	*30*

c Quasi - experimental design
a Rotational design

Year: 1967-8

Ability Parameters	*A.I.*	*Control*
	gI	
$\overline{X}$	*103*	
S.D.	*10.1*	
N	*20*	

Year: 1968-9

Ability Parameters	*A.I.*	*Control*
	gI	*gI*
$\overline{X}$	*108.2*	*106.9*
S.D.	*8.9*	*8.3*
N	*24*	*20*

School M
Level I
Year: 1966-7

Ability Parameters	*A.I.*	*Control*
	gI	*gI*
$\overline{X}$	*108*	*109.6*
S.D.	*8.0*	*8.3*
N	*29*	*30*

Year: 1967-8

Ability Parameters	*A.I.*	*Control*
	gI	*gI*
$\overline{X}$	*109.1*	*105.3*
S.D.	*9.0*	*7.4*
N	*28*	*27*

School N
Level I
Year: 1967-8

Ability Parameters	*A.I.*	*Control*
	g1	*g1*
$\overline{X}$	*110.6*	*109.8*
S.D.	*8.1*	*12.8*
N	*20*	*20*

School O - The set of ability scores for this school was not complete enough to provide the basis for meaningful ability parameters.

School P
Level I
Year: 1967-8

Ability Parameters	*A.I.*	*Control*
	g1	*g1*
$\overline{X}$	*113.4*	*112.3*
S.D.	*6.9*	*8.3*
N	*19*	*17*

School R
Level I
Year: 1966-7

Ability Parameters	*A.I.*	*Control*	
	g1	*g1*	*g2*
$\overline{X}$	*88.7*	*89.7*	*92.4*
S.D.	*9.9*	*9.1*	*9.7*
N	*23*	*19*	*22*

Appendix K

Analysis of Essay Test Data

by

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ANALYSIS OF ESSAY TEST DATA

Introduction

The secondary school courses in American Industry have been developed upon the basis of two general goals: (1) to build an understanding of the concepts which directly apply to industry, and (2) to develop the ability to solve problems related to industry (Face and Flug, 1965). Inherent in the second goal was the assumption that a conceptual style of reasoning would lead to more effective problem solving. The essay test described in this paper was designed to gather data associated with the students' understanding of the concepts of industry and their ability to reason conceptually.

Since knowledges, concepts, and styles of reasoning are internalized, they cannot be measured directly. In other words, a concept cannot be measured by placing a measuring device, such as a ruler, directly on it. Instead, a concept's characteristics have to be ascertained indirectly through its inferred influences on the responses given to various stimuli. Thus, the critical process encompassed in designing the essay test was to determine the intervening role an understanding of the concepts of industry and a conceptual style of reasoning would play in structuring responses to various stimuli. From this information, appropriate test stimuli could be developed and logical answer keys written.

These constructs are analyzed in greater detail in the ensuing paragraphs. The discussion touches on some of the influences of experience on perception, the affects of categorization on response, the role of concepts in thinking, and some of the parameters in concept attainment. A copy of the essay test is reproduced in Appendix K-A for those readers who may be interested in reviewing the test before reading on in the next section.

Framework for the Essay Test

American Industry courses are based on a structured body of knowledges comprised of concepts and their interrelationships. The source of this content is industry. A primary aim in evaluating these courses is to discern any significant changes that take place in the students enrolled in American Industry. A point of departure for delineating the framework, therefore, is the influence of experience on perception and cognitive structure.

A person forms a mental frame of reference based upon the important events and knowledges in his repertoire of experiences. An artist perceives subtleties in form and texture. Others see a piece of pottery. A farmer views fertile soil and effective management during his trips through the countryside. The casual observer traveling the same roads sees tall corn and green fields.

N. R. Hanson (1958) graphically demonstrated the effects of various frames of reference with the use of the sketch shown in Figure 1. A bird watcher would probably see four birds in this drawing.

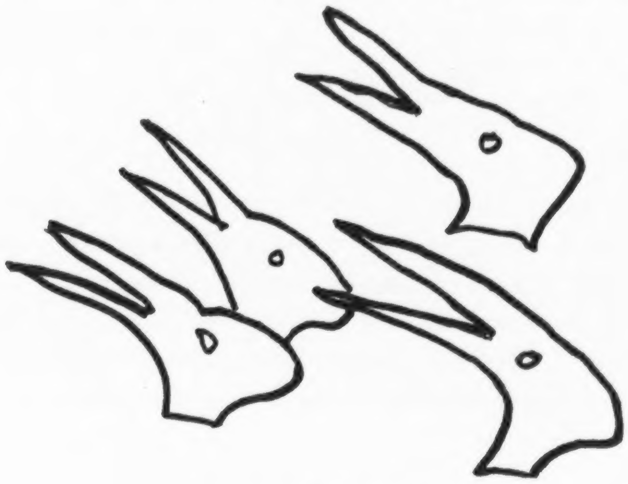


Fig. 1 BIRDS

However, the antelope hunter would identify them as antelope. And, rabbits would be observed by the ardent rabbit hunter.

It is interesting to note that these three people would respond in a different manner to the same retinal image. Yet, three different interpretations are given. What could be the cause of this phenomenon?

Notice that each of the people in the example has a special set of experiences. These experiences provide context for the illustration. Variation in the viewers' mental frame of reference causes them to perceive different animals in the same drawing.

Experience with specific phenomena also increases the number and definitivesness of the responses associated with these stimuli. The Eskimo, for example, has a large variety of words to describe snow. In contrast, there are no words for this type of weather in the vocabulary of the South Sea Islander. The former would be able to provide a unique description for a variety of snowy conditions. The latter would not understand snow.

Bruner (1957) suggested that experience derives meaning from the mental category with which it is associated. The quality of what is perceived, according to Bruner, is a function of two factors: (1) the congruence between the stimulus and the category employed to interpret it, and (2) the degree to which this category has been developed. Categories are amplified through experience and when the contents of a given category become too heterogeneous it is split into more homogeneous categories.

Staats defined a process by which a word acquires meaning from concrete or abstract stimuli and becomes the verbal label for a concept (1961). An ordered series of word responses are connected to this concept label. When the label is presented as a stimulus the ordered list of words forms the response. Another point made by Staats was that the composition and order within the list were the result of experience. Additional experiences may alter the order of the words in the response pattern or add new words to it. If this is the case, and it seems plausible, then the response pattern provides a valid gauge of the cognitive effects of experience.

To illustrate this, Staats' verbal hierarchy hypothesis will be applied to a set of free-association data. The stimulus word was research. Response patterns for seventh grade boys in American Industry and in the control group are presented below. Only the first response of each student was tabulated and only those responses given by more than one student are reported. The numbers in the parentheses represent the proportion of the group giving each response. Variations in content and sequence are readily apparent. Responses made by the American Industry students focus on finding new information or knowledge. In contrast, responses made by the control group center on the discipline and people who do basic research. Since participation in the American Industry course was the distinguishing characteristic between the two groups, the differences can logically be attributed to experiences in this course.

RESEARCH

American Industry	Control Group
Finding, finding out (.27)	Science (.20)
Information (.21)	Scientist (.08)
Problem (.08)	Finding, finding out (.05)
Study (.08)	Development (.05)
Solution (.06)	Problem (.05)
Market (.04)	Experiment (.05)
	Study (.05)
	Information (.03)
	Solution (.02)

Noble has suggested that meaning can be defined in terms of the responses produced for a given stimulus (1952). He also hypothesizes that meaning is a function of the number of responces elicited by a given stimulus. Application of these ideas to the set of data just discussed would reveal that a significant difference in meaning exists between the two groups. Whereas the students in the control group view research as the province of science and scientist, the American Industry students conceive of it as a means to find answers for problems.

A concept is more than a verbal label; and although the responses associated with this label may provide an index of its meaning as a word, the concept may function in a very different manner (Jenkins, 1966). Even though the American Industry students respond with action words to the stimulus word "research", they may react to problems and questions in the same manner as the students in the control group. A more detailed review of the nature of a concept will help to clarify this point.

There are almost as many definitions of the term concept as there are psychologists, philosophers, and educators writing on the topic. However, most agree that a concept permits a person to judge a set of dissimilar objects or events as equivalent on the basis of one or more defining attributes. For example, all people who instruct students are labeled "teachers" by their students although they may vary in sex, age, size, and dress. In addition, when a person is perceived as a teacher he acquires the "characteristics" of a teacher that are encompassed in the student's concept of "teacher". For instance, most students--especially in college--expect a teacher to lecture. This expectation arises from experiences with teachers.

Bruner, Goodnow, and Austin (1956, p. 244) defined a concept as "...the network of inferences that are or may be set into play by an act of categorization." A basic factor in correlating a given stimulus with a specific concept is the ability to properly encode the stimulus. In other words, availability and selection of an appropriate verbal label facilitates the linking of a stimulus with the appropriate concept and triggers the remaining characteristics attached to this concept. These authors also noted that possession of a concept structures the sensory system to look for the concept's attributes in new stimuli.

Three additional properties of concept attainment germane to the design of the essay test are: (1) the tendency for a concept to develop first on a concrete or functional basis and then mature to a symbolic relationship between objects or events, (2) the tendency for a concept to become more difficult to attain as the number of attributes in it increases, and (3) the preference for conjunctive concepts over the relational and disjunctive types. Bruner (1964) summarized man's attempts to comprehend a set of related events in the real-world as a process of moving from viewing them in terms of their physical properties to a comprehension of the symbolic communalties encompassed in the set. In some instances, he felt that the first stage could be by-passed if the learner had a highly developed cognitive system and the appropriate symbols. However, Bruner also cautioned that there was a definite risk in doing this.

In general, as the number of relevant attributes in a concept increases, concept attainment becomes more difficult. Increasing the number of irrelevant attributes also adds to the complexity of the learning task. Posner (1964), for example, found that performance decreased as additional dimensions were added to the stimuli employed in his experiment.

Several experimenters, Hunt and Hovland (1960), Conant and Trabasso (1964), and Wells (1963), have found that conjunctive concepts were easier to attain than disjunctive ones. In fact, their subjects were predisposed to search for conjunctive concepts. However, Wells found that training could change this search orientation to some degree.

The ideas discussed in the previous pages are summarized in Table 1.

In general, if the study of American Industry does produce unique learning, evidence of these effects should be found in the students' overt behavior. They should be able to produce more correct responses to questions based on industry, identify common elements in a group of stimuli, and provide more subtle answers than students who were not enrolled. The essay test designed to measure these behaviors is described in the next section.

Essay Test

This essay test is a part of the set of data gathering instruments employed by the Project to assess the outcomes of the study of American Industry. The essay format was selected to allow the student a greater latitude in responding. In addition, this compliments the objective

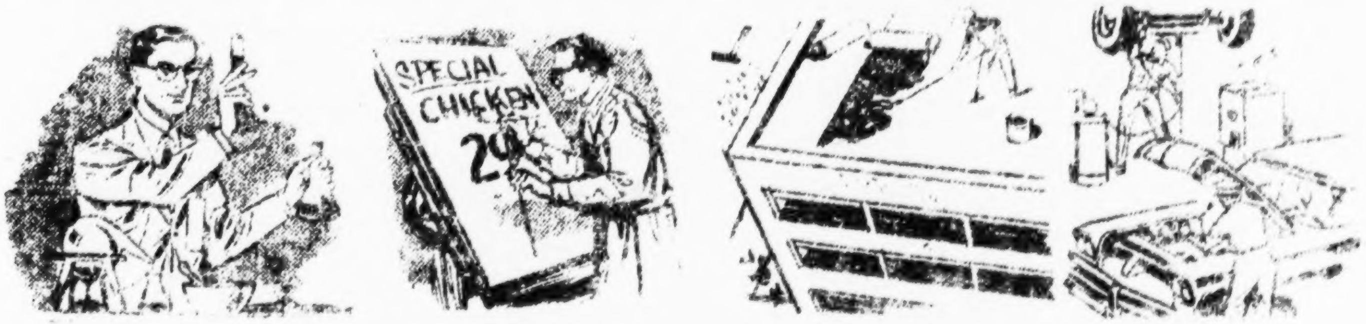
TABLE I

Relationships Among Experience, Cognitive Structure, and Overt Responses

Learning Experience	Influence on Cognitive Structure	Characteristic Overt Response
Experience: *Prolonged and intimate contact with a specific set of objects or events.*	*Produces a mental set based on these experiences, develops more verbal descriptors which are closely related to the phenomena experienced.*	*Tends to view new stimuli as a part of the set even though they may be remotely related. Provides a more definitive and fluent description of the stimulus. Inclination to prefer conjunctive relationships. Likely to associate objects and events that occur together or in close proximity.*
Comprehension of Experience: *Attempts to reduce stimuli to less complex entities.*	*Develops categories or groupings for stimuli--especially those common to the learner's environment. Initiates a disposition to categorize. Extensive experience with a set of stimuli develops concise categories.*	*Places objects or events in the correct category. Differentiates between various stimuli on the basis of the appropriate categories. Tends to group objects or events into categories.*
Concept Attainment: *Experience with categorizing stimuli and attaching meaningful generalizations to the category.*	*One or more concepts related to the generalizations associated with these concepts. Tendency to try to establish concepts to structure experience.*	*Applies concept to valid stimuli and produces inferences associated with it. Develops concepts from concrete to symbolic and from simple to complex attributes. Builds a richer set of generalizations for a given concept as learning progresses. Increases capability to perceive concept in complex stimuli.*

portion of the achievement test in which the student has to select one of the responses designed by the author of the test items.

One of the basic objectives in designing the essay examination was to present test stimuli that were highly correlated with real-life situations in industry. Hence, pictorial stimuli were utilized in the first portion of the test. These stimuli are reproduced below. (A complete copy of the essay test is given in Appendix A.)



Several criteria were established for selecting the stimuli. Their relation to the Project's structure of the knowledges of industry and to industrial activities was considered concurrently. Activities in the sketches had to represent valid industrial activities and fall within the domain of the structure of industry established by the Project. Another important restraint was that several common elements or features had to run through the set of sketches. Moreover, these commonalities had to range from concrete to symbolic. It is rather obvious, for example, that each illustration contains one or more men. This is one of the concrete dimensions. A more symbolic dimension would be represented by the statement that all are using knowledge.

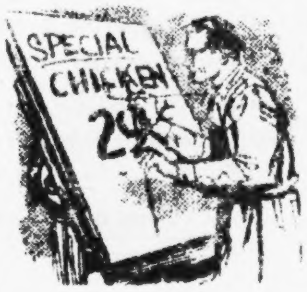
Sketches were also selected that would portray four diverse enterprises. This provided an opportunity to assess the student's conception of industry and activities encompassed in it. Furthermore, the pictures had to be open ended so that a variety of interpretations could be made. This also furnished the chance for concepts to be derived at several levels of complexity. As noted above, man is a common element in each. More complex is the realization that each man is using tools to produce a product.

Verbal questions were written for the last part of the test. A different set was used during the two testing periods in which this test was employed. Both sets are given in Appendix K-A. In general, the questions in this part were designed to evaluate the students' general conception of industry and the relative importance they placed on the various concepts in the Project's structure of the knowledges of industry.

As discussed in the previous section, extended experience in a specific realm should lead to a larger volume of responses and more definitive statements related to a representative subset of stimuli from the domain. Also, when these experiences are selected to convey a conceptual structure of knowledges the logical outcome is the ability to produce subtle answers and associate a given example with several elements in the structure. In other words, the student should be able to identify subtle concepts and relationships among concepts as well as being able to state the salient contents of the example.

To assess these characteristics, the first five items were scored with two keys, fluency and saliency. Scores on the fluency scale indicate the number of correct responses listed for each question. A point was given for each correct response. Responses did not have to relate to the Project's structure of concepts; however, a response had to be unique to garner a point. Thus, for example, responses of "making a sign" and "painting a sign" made by the same individual were scored as one correct answer since they conveyed the same information.

The saliency scale was developed to measure the perceptiveness displayed in the answer. At the most salient end were placed the concrete, simple, and obvious answers. "Man holding a tube", "painting a sign", and "men working" were statements contained in this category. At the least salient end of the scale fell the symbolic and complex answers such as "men using their skills to produce a product" and "men using skills and tools." To illustrate this point consider the content of the second question which is reproduced below.



This depicts a man painting a sign--at least on the concrete level it does. However, at a more perceptive level it shows a man using his knowledge of advertising in an attempt to improve sales. Other subtle ideas embedded in this picture are communication, competition, and profit.

Each saliency scale was comprised of several categories. The categories in each scale were numbered in consecutive order with the most salient category labelled "1" and the least salient assigned the largest number in the series. For example, if there were five categories in a specific saliency scale, the most salient category was represented by "1" and the least salient was represented by "5". To determine the saliency score for a response, the test scorer isolated the least salient idea in the answer, read the numerical label for the category in which this idea fell, and recorded this number as the saliency score. (A complete description of the saliency keys is given in Appendix K-B).

A third key, concept label, was designed to measure the degree of utilization of the concept labels by the responders. This was suggested by the work of Bruner and Staats reviewed earlier in this paper. Correlations between the degree to which the concept labels are used and the fluency and saliency scales will provide some evidence of the value of these labels to the responder.

Keys for the remaining items in the test were developed to measure the scope, sequence and saliency of the responses. Scope is a gauge of the breadth of knowledge. Sequence gives an individual of the hierarchical structure of the responder's knowledge and to some degree the values he places on elements in this structure. Saliency measures the depth of perception found in the response. (These keys are found in Appendix K-B).

Reliability and Content Validity of the Test

Two reliability measures are basic to the interpretation of the data reported in the succeeding pages. First, the reliability of the scoring procedure must be high enough to insure that the test keys have common meaning and that they have been consistently applied. Second, the students' responses have to be reliable.

To assess rater reliability, a second rater scored a sample of the answer sheets. The sample was selected to include tests scored at various points in the test scoring sequence. Comparison of the twc sets of ratings gave the following statistics for each sample and scale. All of the coefficients are high and indicate a high association between the two sets of ratings. Absence of large fluctuations in the values of the coefficients gives evidence that the scoring process was uniform through the complete set of answer sheets.

Scale	Correlation Between Raters 1 and 2[1]			
Fluency	.94	.95	.97	.94
Saliency	.97	.99	.98	.98
Concept Label	.99	.98	1.00	.94

These correlations[2] provide an important measure of the degree of association between the ratings made by the two raters. However, they do not give an exact measure of actual correspondence or agreement in the ratings made by each person. For instance, if the two sets of ratings varied by a constant factor, the correlation would be high but the individual ratings would not be identical. Arp (1969) has analyzed this problem in detail and suggested that Scott's (1955) pi formula[3] be employed to determine the degree of agreement between raters.

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[1] Each coefficient is for a separate class in the sample and represents different points in the test scoring sequence.

[2] Pearson product moment correlation coefficients.

[3] $\text{pi} = \dfrac{P - PE}{1 - PE}$; $P = \dfrac{\text{Number of ratings agreed upon}}{\text{Total number of ratings}}$

PE = Proportion of agreement expected by chance

The proportion of identical ratings and the degree of chance agreement are accounted for in this formula. The pi values for each scale in each of the samples are listed below. In addition, the percentage of identical ratings is listed under P. The samples are listed in the same order as used to present the reliability coefficients.

	Samples							
	1		2		3		4	
Scale	pi	P	pi	P	pi	P	pi	P
Fluency	.72	.80	.81	.88	.70	.80	.71	.85
Saliency	.90	.88	.92	.91	.81	.83	.88	.90
Concept Label	.90	.92	.89	.92	.94	.96	.91	.93

These P and pi values have to be interpreted in a different manner than the correlation values. P represents the proportion of identical ratings found in a given sample. Thus, for example, twenty of twenty-five fluency ratings for sample one were identical. The maximum magnitude of pi is one. In most instances, Arp suggested that pi can be interpreted only in general terms such as high, medium, or low. Pi values in Table 1 would appear to indicate a high level of agreement between raters. The P values also confirm this conlcusion.

Some evidence is available on the stability of the test scores. One group of students completed the essay test in the spring of 1968 and later took the test again in January of 1969. The first five items were identical for both administrations. Retest correlations for the fluency, saliency and concept label scores for the three items were .69, .70, and .64 respectively. Considering the time interval between testing, these coefficients appear to reflect considerable stability in the essay test scores.

Content validity of the test can be assessed by comparing its items with the attributes prescribed for the test on pages nine and ten. The contents of the pictorial test stimuli meet the criteria set forth on those pages. Since the verbal questions were selected to provide more specific information on the outcomes of the American Industry courses, content validity has to be judged on the basis of their capacity to gather data related to a comprehension of the influences exerted by industry and the nature of a business enterprise. The verbal questions also seem to meet the criteria established for them.

The data presented in this section indicate that the test can be reliably socred and that the test scores are fairly stable. In addition, the items appear to be valid measures of the traits to be evaluated.

Results

The essay tests described in this paper were administered at the end of the second semester of the 1967-68 school year and again at the end of the first semester of the 1968-69 school year. American Industry and control group students completed the test.

TABLE 2

Comparative Performance of American Industry and Control Group Students in Items 1 - 5 In the Essay Test

		Result of the Comparison [6]		
Item	*Scale*	*Favored American Industry*	*Favored Control*	*No Significant Difference*
	F	*1*	*0*	*9*
1	*S*	*1*	*0*	*9*
	C	*3*	*0*	*7*
	F	*0*	*0*	*10*
2	*S*	*1*	*0*	*9*
	C	*3*	*0*	*7*
	F	*1*	*0*	*9*
3	*S*	*1*	*0*	*9*
	C	*1*	*0*	*9*
	F	*1*	*0*	*9*
4	*S*	*1*	*0*	*9*
	C	*0*	*0*	*10*
	F	*0*	*0*	*10*
5	*S*	*0*	*0*	*10*
	C	*0*	*0*	*10*

---

[6] *Numbers in the table indicate the number of comparisons. Comparisons were made with the Kolmogorov-Smirnov Two Sample Test.*

TABLE 3

Comparison of Mean Response Values For Items 1 - 5 on the Essay Test [7]

Comparison of $\overline{X}$ Values

Item	Scale	Favors American Industry	Favors Control	Neutral
	F	7	3	0
1	S	9	1	0
	C	9	0	1
	F	7	3	0
2	S	8	2	0
	C	8	2	0
	F	6	4	0
3	S	7	3	0
	C	7	3	0
	F	6	2	2
4	S	6	4	0
	C	7	3	0
	F	9	0	1
5	S	6	3	1
	C	8	2	0

---

[7] *The mean response values for a specific item and scale are compared. The "favored" group is the one with the larger value. If $\overline{X}_{A.I.} = \overline{X}_{C}$, then the comparison is considered neutral. Figures in the table indicate the number of comparisons in each category.*

Several of the comparisons involved quasi-experimental settings. In order to equalize the ability levels of the American Industry and control groups in these settings, the students were categorized as below average,[4] average, and above average ability on the basis of their standard test scores. Then students were randomly selected to establish experimental and control groups with equal numbers in each category.

A review of the data from the test revealed that they were not normally distributed. Thus, a nonparametric test, the Kolmogorov-Smirnov Two Sample Test (Siegel), was utilized to make the comparisons reported in Table 2. Each comparison represents one school.

As indicated in Table 2, several American Industry groups performed significantly better $(P<.05)$ than their control groups on the first four items on the test. Most of the comparisons, however, were not significant. Moreover, there were no significant differences on item five which measures the ability to derive concepts from a set of stimuli.

Semester and year length programs are encompassed in this analysis. Also, Level I and Level II courses are included. No specific pattern appeared for either of these variables, hence, the data were pooled.

While the comparisons were being made, it was observed that response patterns tended to favor the American Industry groups even if the comparisons were not significant. The results of comparisons based on the mean response value for each scale for the first five items are given in Table 3. If there were no differences between the American Industry and control groups, approximately the same number of comparisons should favor each groups. However, if the study of American Industry has some effect, even though it is not significantly large enough to be discerned by the statistical test, the bulk of the comparisons should favor the American Industry groups. In this instance, when there are two[5] or less comparisons favoring the control group one could suspect some systematic factor influencing the performance of the American Industry groups.

As shown in Table 3, the majority of the comparisons for the three scales on each item favor the American Industry groups. In addition, on several items eight or more of the comparisons favor the American Industry groups. For example, the American Industry students performed considerably better on the first two items and the fluency scale on item five. This would seem to indicate that the study of American Industry had some influence on the student's cognitive structure and ability to think conceptually.

Two of the likely consituents of concept learning and reasoning are experience and mental ability. The relationships between these two variables and the performance of the American Industry students on the fluency and saliency scales for item five are graphically presented in Figure 2. In this figure, experience has been equated with age and is represented by grade level.

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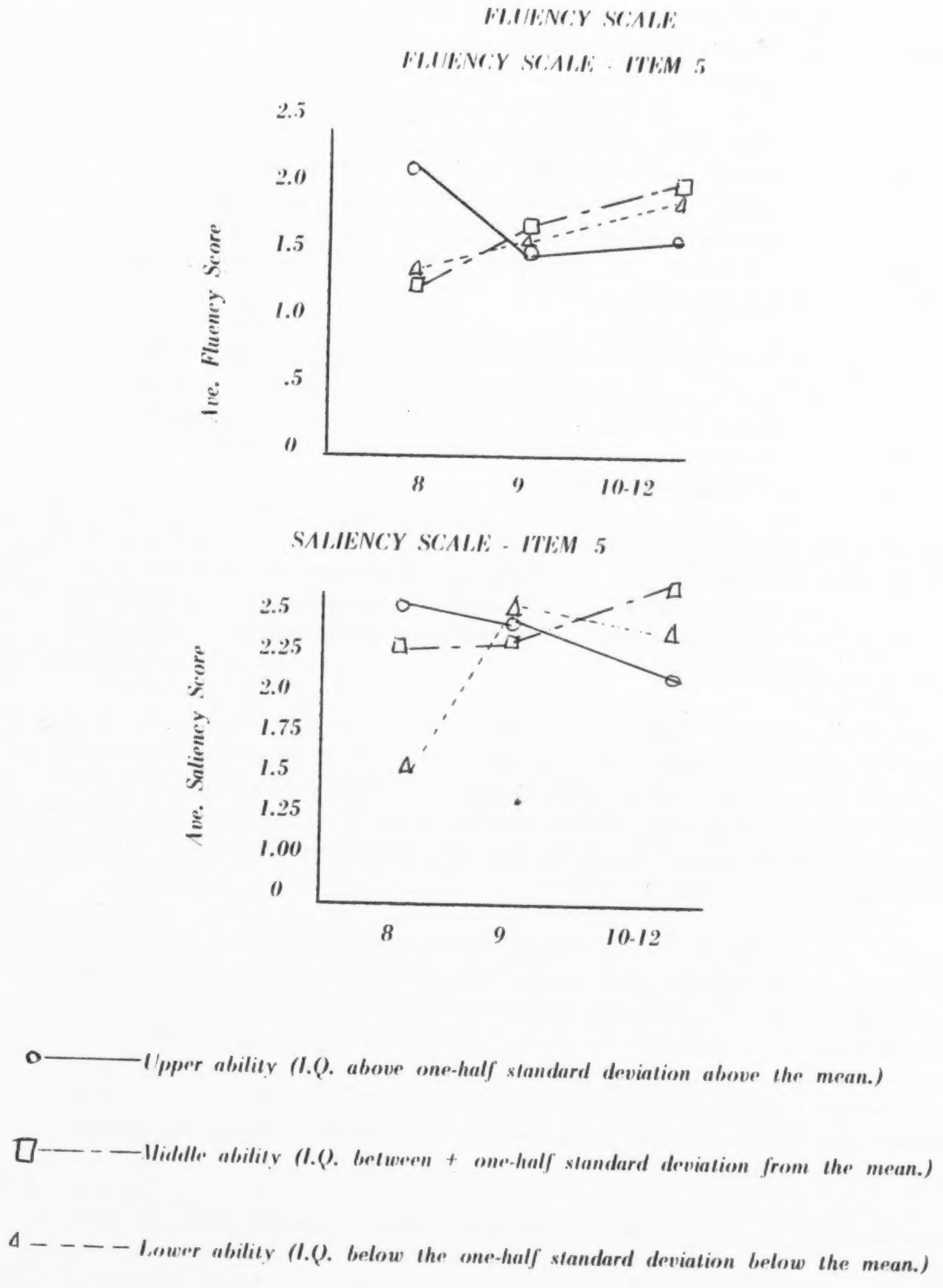
[4] Below average is any score lower than one-half standard deviation below the mean of the standard test. Average is ± one-half standard deviation from the mean. Above average is any score higher than one-half standard deviation above the mean.

[5] Calculated with the binomial expansion and $P=.5$.


FLUENCY SCALE

FLUENCY SCALE - ITEM 5

SALIENCY SCALE - ITEM 5

Fig. 2. Effects of Age and Ability on the Performance of American Industry Students on Item 5 in the Essay Test.

There are no significant differences on either of the variables, age and mental ability, for the fluency scale although the differences between the high ability group and the remaining two ability groups in grade eight approach significance. The upward trend in performance for the lower and middle ability groups in each succeeding grade level is a logical outcome. However, the downward trend of the high ability group is somewhat the reverse of what was expected. A possible explanation for this may be the fact that the eighth grade sample is, for the most part, comprised of students taking a required course. Thus, the eighth grade students are heterogenous in regard to ability and interests. In contrast, the other two grade levels are based upon students in elective courses. As a result interests--especially those in the high ability group--may have a large effect on performance.

On the saliency scale there were two significant differences. Both the upper and middle ability groups in the eighth grade sample performed significantly ($<$.05) better than the low ability group. Of special interest is the performance trend of the high ability group over the three grade levels. As in the fluency scale, the trend is down. Thus, the two sets of data confirm the same trend for the high ability group.

Two sets of verbal questions were utilized--one set for each administration of the essay test. During the 1968 administration, one item related to the student's comprehension of the effects of industry was included in the test. The 1969 version contained two questions that pertained to the ingredients required to start and maintain a successful business. (These items are reproduced in Appendix K-A.)

Responses to Item 6 in the 1968 essay test are summarized in Table 4. Separate averages were computed for each group, American industry and control. To illustrate this, consider the 71 percent entered after scale A1 for the American Industry students. This indicated that 71 percent of all of the American Industry students gave an answer in this category. The figures listed in the column entitled "range" indicate the high and low percentages found in the six individual school encompassed in the two groups.

The response patterns for fluency and saliency were originally compared in each of the experimental settings. However, there were no significant differences on either dimension in any of the settings. To gain a general view of the nature of the responses the fluency dimension was reduced to two categories to indicate whether the student did or did not give a response in a given category. In this new format, a student was scored as responding or not responding in a specific category. These results were then tabulated for all of the American Industry students and all of the control group students. This tabulation reveals the frequency of the various types of responses.

A complete description of the scales for this item is given in Appendix K-B. In brief, scale A represents the ways industry provides for specific needs: A1 - needs of a consumer, A2 - needs of a worker, A3 - needs of a student, and A4 - needs of a citizen. Scale B defines three ways in which industry influences our environment. Scale C includes five sub-scales concerned with specific ways participation in the class affected the students: C1 - skills, C2 - knowleges, C3 - understanding, C4 - relationships between students, and C5 - opportunity to make projects.

TABLE 4

Summary of Responses on Item 6
In the 1968 Administration of the Essay Test

	American Industry		Control Group	
Scale	*Composite Average*[8]	*Range*	*Composite Average*	*Range*
A1 - Consumer Needs	71	56-88	69	63-86
A2 - Worker Needs	31	6-42	39	11-52
A3 - Student Needs	7	0-12	8	0-14
A4 - Citizen Needs	3	0- 9	0	0- 0
B1 - Physical Environment	10	0-18	10	7-12
B2 - Economic Environment	15	4-26	7	0- 9
B3 - Social-Psychological Environment	17	7-30	17	11-29
C1 - Skills	1	0- 3	Does not apply	
C2 - Knowledges	3	0- 7		
C3 - Understanding	0	0- 0		
C4 - Relationships	0	0- 0		
C5 - Projects	0	0- 0		

---

[8] *Figures in the table are percentages based on the responses of the American Industry and control group students in the adjusted samples who gave an answer in the specific category. The averages are based upon the responses of the total group. Range defines the high and low percentages found in the six individual settings for each scale.*

Some apparent differences are revealed in Table 4; however, these are artifacts of the summary process which adds up the trends found in individual comparisons. The striking aspect of these data is the similarity between the American Industry and control groups. It is also readily apparent that students are significantly more aware of how industry satisfies their personal physical needs than they are of how industry affects them as a student or how it influences their environment.

Scale C was included to appraise the number of American Industry students who confused their class with industry. Hence, the low number of responses in this scale is a positive indication that American Industry students could select the proper referent for this question.

There were no significant differences on the saliency scale for Item 6. As is obvious in Table 4, the preponderance of the answers dealt with the salient ways industry influences the life of a student.

During the second administration of this essay test, item six was replaced by two new items. The purpose of these new questions was to ascertain the student's comprehension of what was required to start and maintain a successful business. These items were scored in a manner that would record the nature of each response made by an individual and the sequence in which he wrote his responses.

Tables 5 and 6 present a summary of the responses made by the American Industry and control group students. As in the case of item six on the first administration of the test, there were no significant differences on the individual comparisons; thus, the data were pooled into two sets--American Industry and control group. The data from four schools are included in these tables. There were approximately seventy-five students in each group. The tests were administered at the end of a semester course in American Industry.

Numerical labels for the answer categories in Table 5 identify specific responses ranging from a need for a product (1) to a distribution system (6). (A complete description of the scales is given in Appendix K-B). The column totals indicate the percentage of students making a given response. For example, 26.9 percent of the American Industry students listed need for a product as one of the elements necessary to start a new business. Response sequence is listed in the left hand column. Numbers in this column indicate whether the statisitcs in the table represent the first, second, or later responses made by the students to item six. The distribution of the various answers given in a specific response position in this sequence is determined by reading across the row and noting the values under the several response categories. For instance, the first response given by 1.3 percent of the American Industry students indicated that a need for a product, column 1, was required to establish a new business. Continuing to read across this row we find that 1.3 percent of the initial responses said that a product was needed, 12.8 percent identified workers as a required ingredient, 69.2 percent commented that finances were essential, 12.8 percent responded that a new business would have to have property, and no one mentioned a distribution system.

Analysis of the data in Table 5 reveals that the American Industry and control groups are

TABLE 5

Comparative Summary of Responses to Item 6 In the 1969 Version of the Essay Test [9]

Answer Categories

Response Sequence	*Group*	*1 Need*	*2 Prod.*	*3 Workers*	*4 Finance*	*5 Prop.*	*6 Distrib. System*	*Total*
1	A.I.	1.3	1.3	12.8	69.2	12.8	0.	97.4
1	Control	2.6	6.5	14.3	54.5	19.5	0.	97.4
2	A.I.	5.1	6.4	48.7	10.3	25.6	0.	96.2
2	Control	2.6	9.1	42.9	5.2	30.0	0.	89.6
3	A.I.	3.8	9.0	23.1	6.4	34.6	5.1	82.1
3	Control	3.9	6.5	14.3	19.5	20.8	3.9	68.8
4	A.I.	10.3	9.0	5.1	2.6	7.7	2.6	37.2
4	Control	10.4	7.8	5.2	2.6	9.1	3.9	39.0
5	A.I.	6.4	0.	0.	0.	0.	3.8	10.3
5	Control	5.2	1.3	2.6	0.	2.6	1.3	13.0
6	A.I.	0.	0.	0.	0.	0.	1.3	1.3
6	Control	0.	0.	0.	0.	0.	1.3	1.3
Total	A.I.	26.9	25.6	89.7	88.5	80.8	12.8	
Total	Control	24.7	31.2	79.2	81.8	81.8	10.4	

---

[9] *The percentages listed in this table are based upon the responses of students enrolled in four schools. The American Industry courses were one semester long.*

TABLE 6

Comparative Summary of Responses to Item 7
In the 1969 Version of the Essay Test[10]

Response Sequence	Group	Answer Categories 1 Human Resources	2 Need	3 Prod.	4 Prodn.	5 Price	6 Mgt.	7 Finance	8 Machines	9 Prop.	10 Distri. System	Total
1	A.I.	20.5	10.3	19.2	0.	0.	20.5	10.3	0.	2.6	6.4	89.7
1	Control	36.4	6.5	19.5	1.3	1.3	5.2	11.7	0.	3.9	2.6	88.3
2	A.I.	23.1	9.0	11.5	2.6	0.	2.6	11.5	7.7	3.8	2.6	74.4
2	Control	16.9	9.1	6.5	5.2	1.3	10.4	11.7	7.8	3.9	3.9	76.6
3	A.I.	15.4	1.3	2.6	1.3	0.	6.4	10.3	14.1	0.	1.3	52.6
3	Control	3.9	11.7	1.3	1.3	2.6	0.	11.7	3.9	2.6	3.9	42.9
4	A.I.	3.8	1.3	0.	1.3	0.	2.6	10.3	1.3	5.1	5.1	30.8
4	Control	2.6	2.6	1.3	0.	1.3	0.	3.9	2.6	0.	2.6	16.9
5	A.I.	1.3	0.	0.	0.	0.	1.3	0.	2.6	0.	1.3	6.4
5	Control	1.3	2.6	0.	0.	1.3	1.3	0.	0.	0.	0.	6.5
6	A.I.	0.	0.	0.	0.	0.	0.	0.	1.3	1.3	0.	2.6
6	Control	0.	0.	0.	0.	1.3	0.	1.3	0.	0.	0.	2.6
7	A.I.	0.	0.	0.	1.3	0.	0.	0.	0.	1.3	0.	2.6
7	Control	1.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.3
8	A.I.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	00.
8	Control	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	00.
9	A.I.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	00.
9	Control	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	00.
10	A.I.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	00.
10	Control	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	00.
Total	A.I.	64.1	21.8	33.3	6.4	0.	33.3	42.3	26.9	14.1	16.7	
Total	Control	62.3	32.5	28.6	7.8	9.1	16.9	40.3	14.3	10.4	13.0	

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[10] The percentages listed in this table are based upon the responses of students enrolled in four schools. The American Industry courses were one semester long.

very similar. Some differences appear but these are primarily the result of summing the data for the four schools. There appears to be a slight tendency for American Industry students to place more emphasis on finances (4) and workers (3) as ingredients in comparison with the control group. This is also shown in the column totals.

Disregarding the comparison with the control group, the descriptive qualities of these data can be used to construct a composite picture of the typical American Industry student's response hierarchy for this question. His first response is most likely to be "finances" followed by "workers". There is less likelihood that he will mention the need for a distribution system(6) In fact, need for a product (1), a product (2), and the distribution system appear to have significantly less response strength or probability that would be inferred from the objectives of the American Industry courses.

Table 6 presents the data on the responses to Item 7 in the 1969 edition of the essay test. This question requested the student to list in order of importance the ingredients of a successful business. Ten answer categories were identified on the basis of the Project's rationale and conceptual structure. These categories are defined in Appendix K-B.

Response sequence and hierarchy can be identified in the same manner as in Table 5. Similarly, the column totals indicate the percentages of students making a given response.

As in Table 5, the response patterns for the American Industry and control students are very similar. The only marked deviations are on the need for the product (2), appropriately priced product (5), management (6), and machines (8). The first two favor the control group and appear to be interrelated to some degree. Since categories 2 and 3--need for the product and product respectively--are closely related, it is interesting to note that the margin for the control group is reduced when the two response categories are considered as one. American Industry students list management and machines with considerably more frequency than the control group. In fact, the management scale has the largest deviation of the scales.

Table 6 also gives a composite picture of the American Industry student's comprehension of the qualities of a successful business. However, they appear to underemphasize several aspects such as marketing.

Discussion

Theoretical and empirical evidence suggest that a person's cognitive structure will strongly influence his perceptions. In addition, a conceptual style of reasoning should be reflected in the ability to categorize stimuli on the basis of one more common attribute. With these principles in mind an essay test was designed to assess the American Industry student's knowledges and concepts related to industry and his ability to derive concepts.

As reported in the previous section, there were few significant differences observed in the comparisons. All of these significant differences favored the American Industry groups. Also, in most comparisons the trends favored American Industry.

Several reasons may underlie these results. American Industry classes meet for a maximum of one hundred and eighty class periods and the semester classes had half as many class periods. This amount of time may not be sufficient to produce significant effects.

It is plausible to consider that the test, especially the pictorial stimuli, may not be sensitive enough to detect actual but subtle changes. However, the high level of agreement between the response patterns on the five pictorial items and the verbal items argues against this.

Another possible reason may center in the teaching methods employed. If the students were not encouraged to relate their activities, knowledges, and concepts to real-life activities and people in industry, they probably did not proceed on their own to do this. As a result the test stimuli would not be perceived as associated with industry. There is some evidence to substantitate this explanation. For example, only fifteen percent of the references to articles on industry that were listed in the Level I lessons were utilized by the teacher (Nelson, 1969). These articles were in common magazines and periodicals. Moreover, the teachers were encouraged to use newspaper articles related to industry; however, only two percent of the lesson feedback sheets indicated that the teacher had secured his own outside references. And, only about half of the participating teachers took their American Industry students on a field trip to industry (Nelson, 1968). If these are a valid measure of the attention given to relating the experiences in American Industry to actual business activities, then it is obvious that significant differences could not be expected.

Response patterns on the verbal questions indicate overemphasis on some concepts and the need to place more emphasis on others. Finance falls in the first category as it was given as the first choice by a majority of the responses on item six. Analysis of past test results has also indicated that this tends to be a prime concern. At the same time, more emphasis should be placed on the importance of defining the need for a product, designing a product to fulfill this need, and developing a marketing system. These facets of a successful business were listed by 26.9 percent, 25.6 percent, and 12.8 percent respectively of the American Industry students answering item six. A similar emphasis was found in the responses to item seven. Obviously, no business will start or succeed unless it has products and a marketing system to sell them.

The results on item five underline the need to do more with developing a conceptual style of reasoning. Actually this emphasis should pervade all three levels of American Industry. During the past year revisions have been made in Level II to place more emphasis on this. In addition, the American Industry teachers probably should be offered more in-service training in the techniques appropriate to the development of conceptual thinking.

An interesting problem precipitated by this study is the effect of laboratory activities on the cognitive structure of the students. Consider, for example, the marketing concept that was identified by less than seventeen percent of the American Industry students as an important

APPENDIX K-A

ESSAY TEST

part of a new or successful business. Yet, each group in this portion of the study engaged in the actual marketing of at least one product. Evidently this participation had only a slight impact on their comprehension of the role of marketing in industry. Further study and experimentation will be required to determine the most efficient ways to use activities to generate concepts.

BIBLIOGRAPHY

Arp, D.B. The problem of reliability in the human coding of textual data. Paper presented at AERA Convention, Los Angeles, February, 1969.

Bruner, J.S. On perceptual readiness. Psychological Review, 1957. 64, 123-153.

Bruner, J.S. Some theroems on instruction illustrated with reference to mathematics. Theories of learning and instruction. Sixty-third yearbook NSSE. Chicago: University of Chicago Press, 1964.

Bruner, J.S., Goodnow J.J. and Austin, G.A. A study of thinking. New York: John Wiley and Sons, Inc., 1956.

Hanson, N.R. Patterns of discovery. London: Cambridge University Press, 1958.

Hunt, E.B. and Hovland, C.I. Order of consideration of different types of concepts. Journal of Experimental Psychology. 1960, 59, 220-225.

Jenkins, J.J. Meaningfulness and concepts. In H. J. Klausmeier and C.W. Harris (Eds.) Analysis of concept learning. New York: Academic Press, 1966, 65-79.

Nelson, O.W. Summary of participating teachers' responses on the 1967-68 end of year report. American Industry Project, Stout State University, Menomonie, Wisconsin, 1969.

Noble, C.E. An analysis of meaning. Psychological Review 1952, 59, 421-430.

Posner, M.I. Information reduction in the analysis of sequential tasks. Psychological Review, 1964, 71, 491-504.

Scott, W.A. Reliability of content analysis: the case of nominal scale coding. Public Opinion Quarterly, 1955, 19, 321-325.

Siegel, S. Nonparametric statistics. New York: McGraw-Hill Book Company, Inc., 1956

Staats, A.W. Verbal habit families, concepts and the operant conditioning of word classes. Psychological Review, 1961. 68, 190-204.

APPENDIX K-B

ESSAY TEST KEYS

Item 6 in Essay Test, 1967-68

6. How does industry affect you? Name as many ways as you can.

Items 6 and 7 in Essay Test, 1968-69

6. What do you need to start a business? List all of the things you can think of.

7. What makes a successful business? Write the answer that you feel is most important first and place the number 1 before it. Then write your other answers in the order of their importance and number them.

ITEMS 1-5

Scale	
I. Fluency	Fluency is the number of correct or appropriate responses made to an item in the test. A response must be unique to be counted. For example, a response to the first item of "man doing research, man doing an experiment" would be scored as one response.
II. Saliency	Saliency is a gauge of the perceptiveness of an answer. Simple answers that reflect concrete and obvious contents of the pictorial stimuli receive a low score. High scores are awarded to the answers based on complex and symbolic interpretation of the test stimuli. The score of the least salient response is recorded. (Keys for each item are given on the following pages.)
III. Concept Labels	The score for concept labels is the number of times the Project's concept labels are used in responding.

SALIENCY SCALE - ITEM 1

Score (Category)	Description of Category and Sample Responses
0	Incorrect response.
1 (Most Salient)	Simple reflection of the physical contents of the illustration "Man working," "Scientist," "Man mixing chemicals."
2	Use of the term research but no indication of the nature of research. "Research," "Man doing research," "Experiment."
3	Response relates the purpose of research-solving problems, testing or developing new products. "Test a product," "Trying to discover new chemicals."
4.	Response gives evidence of a knowledge of research procedures. "Testing hypotheses," "Determining factors that affect a problem."
5 (Least Salient)	Response indicates that the person is utilizing his talents, skills and/or knowledges. "Using his skills," "Applying his knowledge."

SALIENCY SCALE - ITEM 2

Score (Category)	Description of Category and Sample Responses
0	Incorrect response.
1 (Most Salient)	Simple description of the physical contents of the illustration. "Lettering," "Painting it," "Paint brush."
2	Answer shows that the student recognizes that an advertisement is involved but does not perceive the basis of the ad. "Making an ad," "Making an advertisement."
3	Response gives evidence that the student perceives that the basis of the ad is a "special." "Advertising a special," "Advertising a bargain," "Reducing price."
4	Answer demonstrates an awareness of the purpose of the ad --met competition and/or obtain more business. "Advertising to get more business," "Using a special to obtain more business," "Reducing price to meet competition."
5 (Least Salient)	Response gives evidence that the student recognizes the communication aspect of advertising. "let people know," "Advertising to let people know what is on sale."

SALIENCY SCALE - ITEM 3

Scale (Category)	Description of Category and Sample Responses
0	Incorrect response.
1 (Most Salient)	Response relates the obvious physical activities. "Laying the paper," "Roofer."
2	Answer indicates the general purpose and/or sequence of the actions involved. "Maintenance," "Tarring the roof to make it watertight," "Man putting tar on and then laying roofing."
3	Response shows an awareness of the use of skill to do a job and that he is working for a company. "Man using his skills," "Man working for a company."
4 (Least Salient)	Answer gives evidence that the writer perceives the end goal of the actions as providing better working conditions and preserving the building. In other words, links processes to property. "Protect contents of the building," "Applying roofing to preserve the building."

SALIENCY SCALE - ITEM 4

Scale (Category)	Description of Category and Sample Responses
0	Incorrect response.
1 (Most Salient)	Answer gives the physical activities taking place. "Fixing cars," "Replacing parts."
2	Response shows recognition of the nomenclature for the occupation and the purpose of the work. "Mechanics," "Maintenance," "Preventing trouble."
3	Answer relates the contents of the illustration to business or industry. "Business partners," "Part of industry."
4	Answer gives evidence of an awareness of the worker specializing and/or the fact that production is taking place." Each man is doing a special task," "Production," "Specialized use of skills."
5 (Least Salient)	Response describes the activity as research or problem-solving activity. "Solve a problem," "Research to solve a problem."

SALIENCY SCALE - ITEM 5

Scale (Category)	Description of Category and Sample Responses
0	Incorrect response.
1 (Most Salient)	Answer identifies the common physical elements present in the four test stimuli. "Men working," "Men doing a job."
2	Response indicates an awareness of the worker's role in industry. "All are working for a business," "All of the men are servicing or making something."
3	Answer demonstrates an awareness of the goal of the work. "Working for money," "Working to produce a profit."
4	Response notes the use of specific talents. "They are doing the jobs they were trained for," "Using their knowledge," "Specializing."
5	Answer relates the fact that the men are a part of the larger institution of industry and, as a result, various relationships are involved. "Working to please customer." "Trying to satisfy needs."

6 (Least Salient)	Answer identifies the use of tools, skills, and knowledges to produce a service or good. Also, may identify the relationships among these three elements "Using tools and skills to produce a product," "Using tools and materials to produce a service or good," "Skillfully using tools."

SALIENCY SCALE - ITEM 6 IN THE 1967-68 ESSAY TEST

Score (Category)	Description of Category and Sample Responses
0	Incorrect response.
1 (Most Salient)	Answer refers to the fact that industry supplies physical needs. "Provides food and clothing for me."
2	Response indicates that industry provides jobs. "Gives me a chance to get a job, " "Provides a job for my father."
3	Answer identifies industry's affect on the student's standard of living. "Makes for a better way of life," "Provides new and better products," "I have more things than people in previous ages have had."
4	Response relates to the effects industry has on our physical and social environment. "Changes my surroundings," "Help build communities," "Affects air and water."
5 (Least Salient)	Answer refers to the influence industry has on the student's future. "Industry increases knowledge," "Industry creates new jobs."

FLUENCY KEY* - ITEM 6 IN THE 1967-68 ESSAY TEST

I. Scale A; Industry provides for specific needs.

Sub-Scale	-	Sample Responses in Category
A.1 As a consumer	-	"Provides needed products."
A.2 As a worker	-	"Provides a job for me," "Will provide a job for me."
A.3 As a student	-	"Produces books (products) to help me learn."
A.4 As a citizen	-	"Pays taxes to local (or other) government," "Helps community."

II. Scale B: Industry influences environment.

Sub-Scale		Sample Responses in Category
B.1 Physical	-	"Builds products that make life easier."
B.2 Economic	-	"Provides wages for Dad."
B.3 Social-psychological	-	"Develops products that make life more enjoyable," "Causes people to settle in urban areas."

III. Scale C: American Industry Class (comments related to this).

C.1 Skills	-	"Developed ability to do________ ."
C.2 Knowledge	-	"Learned about business."
C.3 Understanding	-	"Learned why businesses need to________."
C.4 Relationships between people	-	"Gave me a chance to work with my classmates."
C.5 Project	-	"Had the opportunity to make a product."

* A student is scored on the basis on the number of correct responses on each sub-scale.

KEY FOR ITEM 6 - ESSAY TEST, SEMESTER I, 1968-69

Response Category	Description of Category
1	Need for a product. (Customers or potential customers or people with needs.)
2	Product to satisfy this need. (This includes the product design phase.)
3	Workers, (People with knowledges and skills.)
4	Finances. (Money, stock, credit, etc.)
5	Property. (Machines, materials, buildings, tools, etc.)
6	Distribution System. (Advertising, transportation, and sales.)

Scoring * - Score 0 or 1 for each category; zero if not answered or incorrectly answered; 1 if answered correctly.

Total Score - Total of the categories with a correct response.

* When the item was scored the sequence of responses was recorded by listing the numerical labels for the categories in the order in which they were found in the answer.

KEY FOR ITEM 7 - ESSAY TEST, SEMESTER I, 1968-69

Response Category	Description of Category
1	Human resources. (Skill, knowledge, motivation, help, labor, etc.)
2	Need for the product(s). (Includes customers or potential customers.)
3	Product or quality product. (A product that partially satisfies needs.)
4	Ability or capability to make product. (Ability to produce, make, or assemble product.)
5	Appropriately priced product. (Efficient production system, low cost of production.)
6	Management. (Planning, managers, planners, etc.)
7	Finances. (Money, loans, credit, profits, etc.)
8	Machines. (Equipment, tools, and tooling.)
9	Property. (Buildings, factory, materials.)
10	Distribution system. (Marketing, sales, advertising, transportation.)

Scoring @ - Score 0 or 1 for each category; zero if not answered or incorrectly answered; 1 if answered correctly.

Total Score - Total of the categories with a correct response.

@ When the item was scored the sequence of responses was recorded by listing the numberical labels for the categories in the order in which they were found in the answer.

SELECTED INTERESTS, ATTITUDES, AND OCCUPATIONAL BEHAVIORS OF AMERICAN INDUSTRY STUDENTS: A COMPARATIVE STUDY

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Introduction

When the American Industry secondary curriculum was designed the authors hypothesized that students completing one or more courses in American Industry would exhibit significantly different vocational behaviors and interest in industry than their counterparts who were not enrolled. The instrument reproduced in this report was designed to give one assessment of behaviors related to these hypotheses. Additional information will be gathered through follow-up and case studies.

Data Collection and Analysis

At the end of the 1967-68 school year students in a sample of the American Industry and control classes, were asked to respond to the forty statements listed in Tables 1 and 2. Five responses were designated on the response sheet: "strongly disagree," "disagree," "undecided," "agree," and "strongly agree." In Tables 1 and 2 these responses are re-represented by SD, D, U, A, and SA respectively. The sixth heading, NR, indicates the number not responding.

Table 1 gives a summary of the responses made by the American Industry students who completed the opinionnaire. Table 2 presents a similar summary for students who did not take American Industry. In both tables the first figure in each column gives the total number of students marking the given response. The second figure, in parentheses, lists the percent of the group that marked the response.

Date in these tables do not represent all of the students encompassed in the Project's evaluation. A random sample of schools was selected in order to reduce the total time required to complete evaluation instruments in the participating centers. Also, the variation in evaluation designs within the selected schools resulted in the difference in number between the American Industry and control groups.

The analyses reported in subsequent paragraphs are based on the data in Tables 1 and 2. As noted above, these date are summed over several schools and grade levels. In addition, it was assumed that the level of measurement represented by the response area between SD and SA was ordinal. Hence, statistical tests were selected to evaluate ordinal data and the analysis in general was kept at a gross level. These are two important constraints but they do not reduce the value of the data in answering certain important questions as will be pointed out later.

Four general areas were designated within which to construct items for the opinionnaire. These areas were occupational behaviors, attitude toward industry, interest in industry, and class activities. Each of these areas was selected because it would provide relevant data. The first three pertain to general outcomes of the course. The last category, class activities, concerns specific opinion related to the nature of industry and the structure of the American Industry course. It was included to assess the effects of various learning conditions and activities built into the course.

The areas and the numbers of the items encompassed in each are listed below:

Occupational Behaviors	Attitude Toward Industry	Interest in Industry	Class Activities
8	4	1	3
13	7	2	11
35	9	5	12
38	10	6	16
39	14	15	17
	18	20	23
	19	22	24
	21	29	26
	25	34	27
	28		32
	30		37
	31		
	33		
	36		
	40		

Two statistical comparisons were made using the data that appear in Tables 1 and 2. First, chi square values were calculated for the American Industry and control group data on each item. Next, the two groups were compared on the complete set of responses in each category.

The values obtained for the chi square statistic disclosed significant differences, $P < .05$, on ten items. Further investigation of these items revealed that in each case the response patterns favored the American Industry students. The significant items and the categories in which they are located are listed below.

A. Occupational behaviors

Item 13. I will probably work in industry.

Item 38. There are many job opportunities in industry that I did not know about before taking this class.

B. Attitude toward industry

Item 21. Industry has little influence on me.

Item 25. Industry charges too much for its products.

Item 28. Industry offers a variety of job opportunities.

Item 31. I have greater appreciation for industry after studying it in class.

Item 36. Products produced by industry are usually of low quality.

Item 40. Industry provides an opportunity for people to develop their abilities.

C. Interest in industry

Item 6. I find it interesting to look at the designs used in the products sold in local stores.

D. Class activities

Item 26. I had a chance in this class to develop some of my ideas for products.

Of the four categories, attitudes toward industry and occupational behaviors apparently are influenced most strongly by the study of American Industry. However, the significant items in the remaining two categories also shed light on the outcomes of the study of American Industry. For instance, the responses on item 26 indicate that the American Industry students had a greater opportunity to solve problems in class.

The second analysis entailed a comparison of the total set of responses within each category. For this analysis, the responses SD, D, U, A, and SA were given the values 1, 2, 3, 4, and 5 with five being assigned to the most favorable response. The mean response was then calculated for each group on each item. Comparisons were made on each item to determine which group responded more favorably. In addition, the response patterns were checked to determine what effect a change in scale values would have on the results. In other words, if the extreme responses received more weight, what would happen to the results? These effects were also recorded. Table 3 presents a summary of these data and the comparisons on individual items.

The exact probability of obtaining the results found in each category was calculated by employing the binomial expansion. Use of this statistic was based on the null hypothesis that the responses of the American Industry and control groups represent the same opinions and behaviors. If this hypothesis is true, then either group should have an equal chance of responding more favorably to any given item in the opinionnaire, To illustrate this, consider the items in the attitude toward industry category. If the conditions in the null hypothesis were true, one would expect that each group would have about the same number of items on which its members responded more favorably. However, in this administration the American Industry group responded more favorably on twelve of the fifteen items. The probability of attaining this result if the null hypothesis were true is less than four chances in a thousand.

Outcomes of two of the analyses remain the same under both scaling procedures. American Industry students exhibit a significantly more favorable attitude toward industry ($P < .04$) and response to the items related to their class activities ($P < .033$).

No significant differences were observed in the remaining two categories. Neither scaling procedure would appear to affect these results. The occupational behavior category contains only five items and, thus, all of the comparisons would have to favor one group in order to attain a significant difference. In the interest in industry category, the comparisons favor the American Industry students, $P < .09$, but do not exceed the commonly accepted significance level of .05.

Discussion of Results

The chi square tests identify ten items in which there is a significant difference between the response patterns of the American Industry students and the control groups. All of these differences favor the American Industry students, a fact that is of considerable significance in itself. Moreover, each category in the opinionnaire has one or more items on which a significantly different response pattern was found. This indicates that the study American Industry had some effect in each of these areas.

Analysis of the complete set of individual item comparisons for each category indicated that the American Industry students responded more favorably on the attitude toward industry and class activities items. Hence, it would appear that the American Industry students have had a a positive shift in their attitudes toward industry. They also show a more positive attitude toward the opportunities and products associated with industry. No doubt some of this positive effect carries over to item 13 in which a significantly larger number of American Industry students express a preference for working in industry.

The significant difference found in the set of items related to class activities may be of greater interest to the Project staff than to other people since these items are somewhat specific to the design of the American Industry courses. However, few people will probably quarrel with the educational relevance of the significant difference found on item 26 which reads "I had a chance in this class to develop some of my ideas for products." These data are germane to the Project's objective to develop the problem solving ability of students. The reader is encouraged to review the results on the remaining items in this category and judge their relevance for his work.

In the area of occupational behaviors, the two items, 13 and 38, which were significantly different in the chi square tests indicate that the study of American Industry increases the students' perspectives of the jobs available in industry and their interest in seeking employment in one of them. Both of these effects are important and relevant to the contemporary educational scene.

As noted in the first part of this report, the data in Tables 1 and 2 were obtained from several schools. There was some concern that one or two schools might contribute most to the effects observed. However, review of the results in the individual schools indicated that the statistics for individual classes varied only slightly from those given in Tables 1, 2, and 3.

Other interesting facts of a noncomparative nature can be found in the data reported. Student interest in visiting a business, for example, would appear to be a good learning activity to satisfy student interests and develop new insights into industry. Also, a large number in both groups, about 75 per cent, were aware of the changing nature of jobs in industry. The reader's interest may delineate further items and data of interest as he reads the tables.

Summary

Analysis of responses on individual items and the sets of responses for each category in the opinionnaire disclosed that the study of American Industry had a positive influence on opinions and occupational behaviors related to industry.

TABLE I
UNIT 7 TEST, PART II:
Summary of Responses Made By 1967-68 American Industry Students

STATEMENT		RESPONSE NO.					
		SD	D	U	A	SA	NR
1.	I would like to visit a business to see how it operates	14(3.3)	17(4.0)	32(7.5)	178(41.7)	175(41.0)	11(2.6)
2.	I like to look at products produced by industry	5(1.2)	22(5.2)	72(16.9)	224(52.5)	90(21.1)	14(3.3)
3.	All jobs in a business contribute to its profits	19(4.4)	42(9.8)	86(20.1)	155(36.2)	111(26.0)	14(3.3)
4.	Industry has interesting jobs to offer	7(1.6)	25(5.9)	52(12.2)	180(42.2)	148(34.7)	15(3.5)
5.	I look at advertising to see what sales appeals are used	23(5.4)	81(19.0)	111(26.0)	156(36.5)	40(9.4)	16(3.7)
6.	I find it interesting to look at the designs used in the products sold in local stores	18(4.2)	59(13.8)	106(24.8)	187(43.8)	41(9.6)	16(3.7)
7.	Industry cannot use creative people	275(64.4)	56(13.1)	44(10.3)	24(5.6)	12(2.8)	16(3.7)
8.	Some day I might start a business of my own	30(7.0)	55(12.9)	184(43.1)	91(21.3)	50(11.7)	17(4.0)
9.	Industry provides products I need .	14(3.3)	18(4.2)	25(5.9)	154(36.1)	200(46.8)	16(3.7)
10.	Industry does not need people with skills	278(65.1)	60(14.1)	26(6.1)	27(6.3)	18(4.2)	18(4.2)

* The first figure indicates the number of individuals who selected the response. The number in the parenthesis is the percentage of the total group who selected the response.

Table 1--Unit 7 Test, Part II (cont'd)

STATEMENT	RESPONSE NO.					
	SD	D	U	A	SA	NR
11. Getting along with other people is important in industry	10(2.3)	19(4.4)	42(9.8)	141(33.0)	198(46.4)	17(4.0)
12. Selling products is an important part of industry	11(2.6)	12(2.8)	19(4.4)	159(37.2)	208(48.7)	18(4.2)
13. I will probably work in industry . .	32(7.5)	64(15.0)	161(37.7)	105(24.6)	48(11.2)	17(4.0)
14. Industry does an efficient job of producing products	14(3.3)	23(5.4)	74(17.3)	237(55.5)	60(14.0)	19(4.4)
15. When I am in a store and have time, I look at construction of the products displayed	25(5.9)	86(20.1)	90(21.1)	174(40.7)	36(8.4)	16(3.7)
	SD	D	U	A	SA	NR
16. People have to be able to follow orders in industry	15(3.5)	17(4.0)	25(5.9)	169(39.6)	182(42.6)	18(4.2)
17. I like to compare products before buying one	15(3.5)	24(5.6)	43(10.1)	191(44.7)	135(31.6)	19(4.4)
18. Industry needs people who have knowledge	10(2.3)	14(3.3)	38(8.9)	152(35.6)	198(46.4)	15(3.5)
19. The more skilled a worker is the more pay he receives	26(6.1)	38(8.9)	63(14.8)	162(37.9)	122(28.6)	16(3.7)
20. I like to look at the way materials are used in various products sold in the local stores	19(4.4)	55(12.9)	129(30.2)	168(39.3)	35(8.2)	21(4.9)
21. Industry has little influence on me.	183(42.9)	128(30.0)	46(10.8)	37(8.7)	16(3.7)	17(4.0)
22. I want to find out more about industry	21(4.9)	37(8.7)	139(32.6)	159(37.2)	53(12.4)	18(4.2)

Table 1--Unit 7 Test, Part II (cont'd)

STATEMENT	RESPONSE NO.					
	SD	D	U	A	SA	NR
23. Industry continuously develops jobs that require new skills	7(1.6)	19(4.4)	39(9.1)	196(45.9)	145(34.0)	21(4.9)
24. I have some ideas for products that could be sold	26(6.1)	82(19.2)	140(32.8)	108(25.3)	45(10.5)	26(6.1)
25. Industry charges too much for its products	27(6.3)	102(23.9)	171(40.0)	64(15.0)	42(9.8)	21(4.9)
	SD	D	U	A	SA	NR
26. I had a chance in this class to develop some of my ideas for products	31(7.3)	50(11.7)	80(18.7)	192(45.0)	51(11.9)	23(5.4)
27. All jobs in an enterprise are important	11(2.6)	24(5.6)	55(12.9)	212(49.6)	100(23.4)	25(5.9)
28. Industry offers a variety of job opportunities	7(1.6)	16(3.7)	37(8.7)	219(51.3)	123(28.8)	25(5.9)
29. I have read several news articles on the strikes held this year	40(9.4)	63(14.8)	62(14.5)	186(43.6)	53(12.4)	23(5.4)
30. Industry is not an important part of our society	239(56.0)	76(17.8)	27(6.3)	38(8.9)	20(4.7)	27(6.3)
31. I have greater appreciation for industry after studying it in class .	22(5.2	25(5.9)	101(23.7)	172(40.3)	77(18.0)	30(7.0)
32. A successful business depends on a variety of jobs done well	17(4.0)	21(4.9)	37(8.7)	189(44.3)	136(31.9)	27(6.3)
33. Industry could survive without profits	206(48.2)	91(21.3)	47(11.0)	32(7.5)	19(4.4)	32(7.5)

Table I--Unit 7 Test, Part II (cont'd)

STATEMENT	RESPONSE NO.					
	SD	D	U	A	SA	NR
34. I sometines look at products in local stores to see how they are made	17(4.0)	63(14.8)	87(20.4)	177(41.5)	51(11.9)	32(7.5)
35. This class has changed my thinking about the work I will do after my schooling has been completed	50(11.7)	90(21.1)	124(29.0)	87(20.4)	42(9.8)	34(8.0)
	SD	D	U	A	SA	NR
36. Products produced by industry are usually of low quality	93(21.8)	165(38.6)	74(17.3)	47(11.0)	11(2.6)	37(8.7)
37. Producing the product is the most important part of a successful business	35(8.2)	93(21.8)	100(23.4)	125(29.3)	38(8.9)	36(8.4)
38. There are many job opportunities in industry that I did not know about before taking this class	13(3.0)	64(15.0)	72(16.9)	185(43.3)	53(12.4)	40(9.4)
39. This class has started me thinking about the work I will do after my schooling is done	38(8.9)	67(15.7)	118(27.6)	126(29.5)	38(8.9)	40(9.4)
40. Industry provides an opportunity for people to develop their abilities . .	10(2.3)	18(4.2)	46(10.8)	208(48.7)	105(24.6)	40(9.4)

TABLE 2
UNIT 7 TEST, PART II:
Summary of Responses Made by 1967-68 Control Group Students

STATEMENT	SD	D	U	A	SA	NR
1. I would like to visit a business to see how it operates	7(4.5)	3(1.9)	15(9.6)	93(59.2)	34(21.7)	5(3.2)
2. I like to look at products produced by industry	3(1.9)	14(8.9)	27(17.2)	82(52.2)	27(17.2)	4(2.5)
3. All jobs in a business contribute to its profits	7(4.5)	21(13.4)	30(19.1)	68(43.3)	28(17.8)	3(1.9)
4. Industry has interesting jobs to offer	4(2.5)	18(11.5)	15(9.6)	72(45.9)	41(26.1)	7(4.5)
5. I look at advertising to see what sales appeals are used	15(9.6)	37(23.6)	44(28.0)	50(31.8)	7(4.5)	4(2.5)
6. I find it interesting to look at the designs used in products sold in local stores	19(12.1)	24(15.3)	34(21.7)	59(37.6)	17(10.8)	4(2.5)
7. Industry cannot use creative people.	86(54.8)	33(21.0)	16(10.2)	11(7.0)	6(3.8)	5(3.2)
8. Some day I might start a business of my own	14(8.9)	18(11.5)	67(42.7)	26(16.6)	26(16.6)	6(3.8)
9. Industry provides products I need.. .	8(5.1)	5(3.2)	7(4.5)	62(39.5)	69(43.9)	6(3.8)
10. Industry does not need people with skills	93(59.2)	24(15.3)	13(8.2)	21(13.4)	2(1.2)	4(2.5)

** The first figure indicates the number of individuals who selected the response. The number in the parenthesis is the percentage of the total group who selected the response.*

Table 2--Unit 7 Test, Part II (cont'd)

STATEMENT	*RESPONSE NO.*					
	SD	*D*	*U*	*A*	*SA*	*NR*
11. Getting along with other people is important in industry	*6(3.8)*	*12(7.6)*	*12(7.6)*	*60(38.2)*	*61(38.9)*	*6(3.8)*
12. Selling products is an important part of industry	*3(1.9)*	*5(3.2)*	*7(4.5)*	*61(38.9)*	*75(47.8)*	*6(3.8)*
13. I will probably work in industry . .	*34(21.7)*	*18(11.5)*	*67(42.7)*	*26(16.6)*	*8(5.1)*	*4(2.5)*
14. Industry does an efficient job of producing products	*6(3.8)*	*16(10.2)*	*28(17.8)*	*71(45.2)*	*29(18.5)*	*7(4.5)*
15. When I am in a store and have time, I look at the construction of the products displayed	*7(4.5)*	*33(21.0)*	*31(19.7)*	*70(44.6)*	*8(5.1)*	*8(5.1)*
	SD	*D*	*U*	*A*	*SA*	*NR*
16. People have to be able to follow orders in industry	*4(2.5)*	*4(2.5)*	*13(8.3)*	*53(33.8)*	*79(50.3)*	*4(2.5)*
17. I like to compare products before buying one	*4(2.5)*	*14(8.9)*	*13(8.3)*	*71(45.2)*	*51(32.5)*	*4(2.5)*
18. Industry needs people who have knowledge	*2(1.3)*	*10(6.4)*	*20(12.7)*	*58(36.9)*	*61(38.9)*	*6(3.8)*
19. The more skilled a worker is the more pay he receives	*9(5.7)*	*17(10.8)*	*24(15.3)*	*51(32.5)*	*48(30.6)*	*8(5.1)*
20. I like to look at the way materials are used in various products sold in the local stores	*5(3.2)*	*23(14.6)*	*45(28.7)*	*60(38.2)*	*16(10.2)*	*8(5.1)*
21. Industry has little influence on me	*42(26.8)*	*58(36.9)*	*30(19.1)*	*14(8.9)*	*8(5.1)*	*5(3.2)*

Table 2--Unit 7 Test, Part II (cont'd)

STATEMENT	RESPONSE NO.					
	SD	D	U	A	SA	NR
22. I want to find out more about industry	10(6.4)	24(15.3)	40(25.5)	57(36.3)	18(11.5)	8(5.1)
23. Industry continuously develops jobs that require new skills	2(1.3)	9(5.7)	25(15.9)	64(40.8)	51(32.5)	6(3.8)
24. I have some ideas for products that could be sold	13(8.3)	39(24.8)	44(28.0)	37(23.6)	17(10.8)	7(4.5)
25. Industry charges too much for its products	6(3.8)	20(12.7)	52(33.1)	37(23.6)	31(19.7)	11(7.0)
	SD	D	U	A	SA	NR
26. I had a chance in this class to divdlop some of my ideas for products	18(11.5)	33(21.0)	36(22.9)	50(31.8)	9(5.7)	11(7.0)
27. All jobs in an enterprise are important	6(3.8)	15(9.6)	18(11.5)	69(43.9)	35(22.3)	14(8.9)
28. Industry offers a variety of job opportunities	9(5.7)	15(9.6)	12(7.6)	72(45.9)	38(24.2)	11(7.0)
29. I have read several news articles on the strikes held this year	12(7.6)	17(10.8)	17(10.8)	64(40.8)	34(21.7)	13(8.3)
30. Industry is not an important part of our society	79(50.3)	26(16.6)	18(11.5)	15(9.6)	2(1.3)	17(10.8)
31. I have greater appreciation for industry after studying it in class	15(9.6)	23(14.6)	36(22.9)	43(27.4)	25(15.9)	15(9.6)
32. A successful business depends on a variety of jobs done well	4(2.5)	6(3.8)	20(12.7)	69(43.9)	41(26.1)	17(10.8)
33. Industry could survive without profits	73(46.5)	39(24.8)	14(8.9)	10(6.4)	6(3.8)	15(9.6)

Table 2--Unit 7 Test, Part II (cont'd)

STATEMENT	RESPONSE NO.					
	SD	D	U	A	SA	NR
34. I sometimes look at products in local stores to see how they are made	8(5.1)	23(14.6)	29(18.5)	57(36.3)	26(16.6)	14(8.9)
35. This class has changed my thinking about the work I will do after my schooling has been completed	24(15.3)	34(21.7)	48(30.6)	27(17.2)	11(7.0)	13(8.3)
36. Products produced by industry are usually of low quality	SD 18(11.5)	D 51(32.5)	U 34(21.7)	A 29(18.5)	SA 10(6.4)	NR 15(9.6)
37. Producing the product is the most important part of a successful business	18(11.5)	25(15.9)	26(16.6)	58(36.9)	17(10.8)	13(8.3)
38. There are many job opportunities in industry that I did not know about before taking this class	7(4.5)	27(17.2)	40(25.5)	42(26.8)	27(17.2)	14(8.9)
39. This class has started me thinking about the work I will do after my schooling is done	20(12.7)	33(21.0)	38(24.2)	36(22.9)	17(10.8)	13(8.3)
40. Industry provides an opportunity for people to develop their abilities . .	12(7.6)	11(7.0)	23(14.6)	64(40.8)	34(21.7)	13(8.3)

TABLE 3

Comparison of Average Response Values

Item Category	Average Response Values			Effects of Rescaling	
	American Industry	Control	Result of Comparison	Effect on A.I.	Possible Result of New Comparison
Occupational Behavior					
8	3.19	3.21	C	-	C
13.	3.18	2.71	A.I.	+	A.I.
35.	2.95	2.77	A.I.	+	A.I.
38.	3.51	3.38	A.I.	-	?
39.	3.22	2.98	A.I.	+	A.I.
Attitude Toward Industry					
4.	3.96	3.85	A.I.	+	A.I.
7.	3.42	3.20	A.I.	+	A.I.
9.	4.24	4.19	A.I.	+	A.I.
10.	3.42	3.25	A.I.	+	A.I.
14.	3.75	3.67	A.I.	-	C
18.	4.25	4.10	A.I.	+	A.I.
19.	3.77	3.75	A.I.	-	C
21.	3.04	2.74	A.I.	+	A.I.
25.	3.02	1.54	A.I.	+	A.I.
28.	4.08	3.79	A.I.	+	A.I.
30.	3.19	3.18	A.I.	+	A.I.
31.	3.64	3.28	A.I.	+	A.I.
33.	3.10	3.15	C	0	C
36.	2.73	2.27	A.I.	+	A.I.
40.	3.98	3.67	A.I.	+	A.I.
Interest in Industry					
1.	4.16	3.95	A.I.	+	A.I.
2.	3.90	3.76	A.I.	+	A.I.
5.	3.27	2.98	A.I.	+	A.I.
6.	3.42	3.20	A.I.	0	A.I.
15.	3.27	3.26	A.I.	+	A.I.
20.	3.36	3.40	C	-	C
22.	3.45	3.28	A.I.	+	A.I.
29.	3.36	3.66	C	-	C
34.	3.46	3.49	C	–	C

TABLE 3 -- (cont'd)

Item Category	*Average Response Values*			*Effects of Rescaling*	
	American Industry	*Control*	*Result of Comparison*	*Effect on A.I.*	*Possible Result of New Comparison*
Class Activities					
3.	3.72	3.58	A.I.	+	A.I.
11.	4.21	4.05	A.I.	+	A.I.
12.	4.32	4.32	Even	0	C
16.	4.18	4.30	C	-	C
17.	4.00	3.99	A.I.	-	C
23.	4.12	4.01	A.I.	+	A.I.
24.	3.16	3.04	A.I.	0	A.I.
26.	3.45	2.99	A.I.	+	A.I.
27.	3.91	3.78	A.I.	+	A.I.
32.	4.02	3.98	A.I.	+	A.I.
37.	1.90	1.78	A.I.	+	A.I.

APPENDIX M

Interim Follow-up Study of American Industry Students
(Paper presented at the 1969 AVA Convention in Boston)

by

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American Industry Project
USOE Contract No. OE-5-85-060
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During the past six years, the American Industry Project has been engaged in the development of curricula based on the study of industry. Two basic tasks were involved in this undertaking. First, a conceptual structure of the knowledges utilized by industry was developed. Second, three secondary school courses were designed to provide an understanding of these concepts and to develop the ability to solve problems related to industry. The first course was developed for eighth grade students and provides the experiences necessary for the acquisition of the major concepts in the American Industry structure. In addition, simple problems, one or two salient variables, are solved by the students. In the second course, students have the opportunity to acquire sub-concepts in each of the major conceptual areas defined in the structure and they attack problems with several variables. This course was written for grades nine and ten. The third course allows the eleventh or twelfth grade student to select a problem and investigate it within the framework of the American Industry structure. Students are not permitted to enroll in the advanced courses without having taken the first course.

In American Industry courses, especially the first course, the student also has an opportunity to explore various jobs. The student enterprise activity provides the vehicle for this exploration. In this activity, the class develops a product, produces it, and then sells it. Thus, the student is exposed to a variety of jobs and usually has a chance to perform in several of them.

Each student brings a unique set of abilities and interests to this activity. These interests and abilities are developed through interaction with his environment. Some of these experiences are in sports, school, and hobbies. The jobs in the student enterprise, as in industry, provide an opportunity to utilize abilities and a chance to explore interests. Since jobs vary in terms of the abilities required and the rewards available, it is important that students have an opportunity to encounter an assortment of jobs in order to determine the best match.

Study of the structure of the knowledges used in industry and acquisition of the concepts in the structure should provide the individual with a conceptual network for interpreting his experiences related to industry. The person who has studied American Industry should be more cognizant of how industry operates and his role in this organization. Hence, it was hypothesized that the study of American Industry would have an influence on vocational behaviors. Some evidences of this influence should be found in the student's vocational decision processes, the vocation selected, and tenure in the selected occupation. Since the American Industry students had not been out of high school long enough to provide sufficient data on job tenure, only the first two variables could be evaluated at this time.

Follow-up Results

Ingredients

Most participating schools introduced the first level American Industry course in eighth grade. In some schools, however, this was not feasible because the instructional assignment of the participating teacher was in senior high school. Three of the latter schools provided the students involved in this follow-up study. It should also be noted that these schools used the basic set of materials developed for eighth grade and modified the pace and the activities to make them appropriate. All of the American Industry students in this study had only one A.I. Course in high school.

By last spring, there were 121 graduates from the American Industry and control groups in these three schools. At this time, I have returns from 75% of these graduates. And, completed forms are still coming in on an infrequent basis. For instance, I received one from a serviceman last week. Contacts with this group were made through personal letters and a postcard reminder. The initial contact was a personal letter accompanied by the follow-up form. This produced 45% of the responses. The second contact was also a personal letter and this resulted in an additional 12% of the responses. Ten days after the second letter, a postcard reminder was mailed to the non-respondents. This produced an additional 10% of our responses. Two weeks after the postcard, another personal letter was mailed to the non-responders. Another 8% responded to this mailing. A follow-up form was sent with each letter.

The completed forms were reviewed as they were received. There did not appear to be a significant difference in the responses that resulted from the different contacts. In other words, the last returns did not have more negative comments than the first returns. In several instances, the responder to later contacts apologized for forgetting to return the initial form.

One cause of some of the forms not being returned was overseas duty in the armed services. Slightly more than 9% of the returns came from servicemen most of whom were stationed in this country. In addition, several parents responded that the follow-up forms were being forwarded to their sons overseas. Lack of proper addresses was a minor problem in this study. Less than 4% of the mailings were returned for this reason.

The proportion of responses from the American Industry and control groups was similar. In the control group 73.5% responded and 75.9% of the American Industry students returned their forms.

Average ability scores for the responders in the American Industry and control groups were also very similar. (See Table 1) School C had only a few American Industry graduates and there were no graduates from the control group. It was of interest, however, because there were three female members in this sample. A comparison of average ability scores within the schools where American Industry control groups were present indicates that there was no significant difference between the two groups in each school.

Results

Preliminary examination of the data for each school revealed similar response patterns in the three American Industry groups. Likewise, similar response patterns were observed in the two control groups. Thus, to facilitate analysis and bring brevity to this report, the data were pooled for the three American Industry groups and the two control groups.

TABLE 1

Average Ability Scores of Respondents

	School A		School B		School C
	A.I.	Control	A.I.	Control	A.I.
$\bar{X}$	101	102	101	104	106
N	15	10	45	15	6
s.d.	10.8	8.5	9.5	10.4	6.4

Occupational Status of Responders. The employment status of the students in the American Industry and control groups is presented in Table 2. With the exception of the proportion attending school and the number in the armed services, both groups exhibit similar employment patterns. If the proportions in school and armed services are combined, the totals for the two groups are very similar. Since college students have been deferred, this may explain some of the difference in the per cent of each group in the armed services. Three students mentioned that their experiences in American Industry stimulated them to go on for further education after high school and six more noted that American Industry had shown the value of education in industry. Thus, these influences may be a basic cause of the difference in the number enrolled in school. The proportion attending school and the average I.Q.'s listed previously indicate that the students in these groups are not from the high end of the continuum.

TABLE 2

Employment Status[1]

Employment Status	American Industry	Control
Employed, full-time	51.5% (34)	56% (14)
Employed, part-time	9.1% (6)	12% (3)
Unemployed	3% (2)	0% (0)
Attending school	21.2% (14)	8% (2)
Armed services	15.2% (10)	24% (6)

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[1] Numbers in the parenthesis in the tables identify the actual number in the cells.

The occupational status of those not in the armed services or school is given in Table 3. An apparent difference can be noted in the proportion of individuals in unskilled and semi-skilled positions. The small number in the follow-up study plus the attrition due to service obligations and advanced schooling make it inappropriate to statistically compare these numbers. This will be an interesting trend to investigate in later follow-up studies.

TABLE 3

Occupations for Respondents Who are Not in School or the Armed Services

Occupation	*American Industry*	*Control*
Farming	*12% (6)*	*11.8% (2)*
Unskilled	*34% (17)*	*52.9% (9)*
Semi-skilled	*36% (18)*	*17.6% (3)*
Skilled	*14% (7)*	*17.6% (3)*
Managerial	*4% (2)*	*0*

Influence of the Study of American Industry on Educational and Occupational Plans. American Industry students were asked of identify how their study of American Industry influenced their educational and occupational plans. Students in the control group were asked to list how their high school courses influenced these plans. Note that the effect of one course in American Industry is being compared to that of approximately twelve courses in the high school program of the students in the control group.

The high school courses taken by the control group were reported to have more impact on educational plans than the study of American Industry (see Table 4.) The chi square value for this set of data was not significant. Even though the American Industry group reports fewer effects, several of those reported were substantial. For example, one young man commented that his experiences in marketing led him to pursue a college degree in marketing research. Another remarked that he became aware of the importance of knowledge in industry and subsequently decided to go on for more education.

TABLE 4

Influence of American Industry and High School Courses (Control) on Educational Plans

Influence	*American Industry*	*Control*
None	*71.1% (47)*	*52% (13)*
Some, general	*13.6% (9)*	*24% (6)*
Specific, selection of courses	*15.1% (10)*	*24% (6)*

Occupational plans tended to be influenced more by the study of American Industry than by the high school subjects taken by the control students (see Table 5). The chi square value for this set of data was not significant. Again, several of the individuals' comments revealed that their experiences in American Industry had an important influence on their selection of a vocation. One young woman, for instance, reported that her experience on the assembly line in a student industry was the basic factor in her selection of a production line job in a manufacturing plant. Her comments indicated that she had never considered that type of job until she had an opportunity to work on an assembly line during a student enterprise.

TABLE 5

Influence of American Industry and High School Courses (Control) on Occupational Plans

Influence	*American Industry*	*Control*
None	*43.9% (29)*	*56% (14)*
Gave information on job opportunities	*39.4% (26)*	*32% (8)*
Basic factor in selecting my vocation	*16.6% (11)*	*12% (3)*

The trends just noted in the influence on occupational selection concur with the findings reported in a previous study carried out by the Project. (Nelson, 1968) At the end of the 1967-68 school year, students in a sample of the American Industry and control classes were asked to respond to forty statements related to their interest in industry, attitude toward industry, and occupational behaviors. Analyses of the data indicated that the American Industry students

were significantly more aware of the large variety of jobs available in industry and more interested in gaining employment in one of them. American Industry students also exhibited a more favorable attitude toward industry. It appears that the effect on occupational behaviors noted at the conclusion of the American Industry course continues to be perceived after graduation.

Major Contributions of the Study of American Industry. American Industry students were also asked to identify the most important knowledges and skills acquired during the course. The most frequent response, listed by 41% of the responders, was "how industry operates." Only 4.5% thought that there was "nothing" of value. In contrast, 6.1% thought that "everything" was of value. The remaining responses were more specific and typically related to one of the concept areas in the Project's conceptual structure or one of the learning activities employed in the course. Most of these remarks were made by one or two individuals, thus no attempt will be made to summarize them here.

American Industry students were also asked to rate the value of their American Industry courses in relation to their work and their everyday activities. Approximately 32% rated American Industry of high value on their jobs. Another 59.7% said that it was of moderate value. The remaining 8.3% said that it was of no value on their job. In relation to their everyday activities, 21.7% thought that American Industry was of high value, 70% said that it was of moderate value, and 8.3% noted it as having no value.

It would appear on the basis of these data that the study of American Industry has made a contribution to the individual's comprehension of his environment. In addition, the person perceived this contribution to be of value.

Dislikes or Changes

The former American Industry students also were asked to identify what they disliked or would want to change in the course. Twenty-five per cent did not identify a dislike or a change. Actually, there was little consensus on specific dislikes or changes. Eight per cent thought that textbooks could be improved. Since these students had read materials designed for students two to three years younger than themselves, there can be little disagreement with this comment. It was interesting, however, to note that the majority of these comments came from a first semester class in one of the schools. The Project's participating teacher informed this class during this semester that the books were written for eighth grade students. The next semester this teacher did not relay this information to his new American Industry class and he observed that these students were much more satisfied with the books.

Approximately 11% of the students suggested that the course should go into greater detail. These were semester courses, thus, there was a definite time limitation. Obviously, the students had perceived this.

More field trips were suggested by 11% of the responders. They mentioned that these trips provide some real life referents for the course content.

The remaining comments were made by one or two students and as often as not they were not critical of the course. For example, one student said that he would study harder if he could take the course over.

Summary

The previous pages have reported some effects of the study of American Industry. Service obligations and advanced schooling have thinned the ranks of those actually employed. However, it appears that American Industry has a worthwhile input into job selection and the person's general knowledge of industry.

Graduates who have studied American industry reported that its content has proved to be of value on their daily activities. They also mentioned that a longer course and more field trips would contribute to the outcomes of their study of American Industry.

As the number of graduates from the American Industry program increases, the Project will be able to follow-up the trends observed in this study. In addition, there will be an opportunity to secure more longitudinal data on this sample.

Reference

Nelson, O.W. Selected interests, attitudes, and occupational behaviors of american industry students: a comparative study. American Industry Project, Stout State University, Menomonie, Wisconsin, 1968.

Appendix N

INTEREST IN AMERICAN INDUSTRY ON THE REGIONAL AND NATIONAL LEVELS

by

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June, 1969

American Industry Project
USOE Contract No. OE-5-85-060
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Dr. Wesley L. Face
Dr. Eugene R. F. Flug

One of the basic motivations for establishing the American Industry Project was the hope that its ideas and products would have a significant impact at the regional and national levels as well as the state level. Now that the Project is nearing completion the degree of this impact should be assessed. Although cause and effect relationships associated with this assessment will be difficult to specify precisely, there are some indicators available which may shed some light on this question. Three of these indicators have been selected for this paper: (1) the responses to an offer to supply papers which was announced in the Project's newsletter, (2) use of the Project's concepts in the professional literature, and (3) invitations to make presentations at national and regional meetings.

Response to Newsletter

Early in the development of the American Industry Project a newsletter was established. The newsletter carried articles related to the participating teachers, and general information related to the Project. The mailing list for this newsletter was constructed from the requests of individuals to receive the mailings of the Project. Typically, the Project staff members carried mailing list forms with them so that interested people could fill out the required information. By the end of the Project's USOE grant over three thousand names were entered on the mailing list. High school industrial arts teachers, high school counselors, college teacher educators and businessmen were included in this list. Periodic distribution of the newsletter was made throughout the four years of the Project's grant.

In the Spring issue of the 1968-69 volume of the newsletter an offer to send free copies of two papers developed by staff members was printed on the last page of the newsletter. The papers were Production Control in the American Industry Laboratory by John Debrauske and Evaluating the American Industry Secondary School Courses by Orville Nelson. These two papers represented two distinct aspects of the Project, (1) secondary school materials and (2) evaluation procedures. It was thought that these two would be appealing to different audiences. A place was included in the offer for the person to identify his name, position, street, city, state and zip code.

When the requests were received by the Project the papers were mailed as directed and the forms were then placed in the file for analysis. The responses were tallied by state and position. The positions identified were secondary school industrial arts teacher, secondary school industrial arts deparment chairman, college industrial arts instructor, chairman of a college librarians, vocational-technical school, and others. Table 1 presents a summary of the requests received by the American Industry Project. A review of Table I indicates that a total of 198 requests were received. Of these requests about 47% came from high school industrial arts instructors. Within this group the largest number of requests came from the state of Wisconsin. The second largest number of requests came from college industrial arts or industrial education instructors with almost 21% of the total requests. College chairmen of industrial arts or industrial education departments had the third highest number of requests for these papers.

Requests were received from 37 states, 1 territory and 2 foreign countries. Included in the "other"column are requests from several unique sources. Several requests came from businesses,

TABLE 1
SUMMARY OF NEWSLETTER PAPER REQUESTS

	HIGH SCHOOL Ind. Arts		COLLEGE Ind. Arts Ind. Ed.		GUIDANCE	VOC-TECH SCHOOL	LIBRARY	OTHER	TOTAL
STATE	Instructor	Chairman	Instructor	Chairman	High School		College		
Arizona	1								1
Arkansas			1						1
California	4	1	3						8
Colorado			1	1					2
Connecticut	3		2						5
Florida	2					2			4
Georgia		1		1					2
Idaho				1					1
Illinois	1	1	2	2	1	1		2	10
Indiana	4	1	4	1					10
Iowa	3		2		1				6
Kansas	4			3					7
Kentucky		1	2						3
Maine				1					1
Maryland	1		1						2
Michigan	4	1	3						8
Minnesota	5		3	1		2		1	12
Missouri	3		2	1			1		7
Montana	2								2
Nebraska	2		1	1					4
New Hampshire						1			1
New Jersey	4	1	1						6
New Mexico			2						2
New York	6	1	3					2	12
North Carolina	2		1	1					4
Ohio	5		3					2	10

one request from a provincial supervisor of industrial education in Canada.

Requests for the papers represent level 2.2, willingness to respond, in the taxonomy for the affective domain. (Krathwohl, Bloom, and Masia, 1964.) In other words, this was a voluntary response based upon the interests of the responder. Although the application process was simplified with a form, the responder had to complete the form, address an envelope and mail the form. This is a relatively simple process but it does require time, effort and the expenditure of some money. In addition, responding at this level in the taxonomy for the affective domain suggests that the people making the requests are receptive to exploring the ideas and concepts delineated by the American Industry Project. (Levels 1 through 2.1 in the affective taxonomy.)

American Industry Concepts in Professional Literature

To gain some insight into the impact that the American Industry Project had on professional literature the volumes of IAVE for 1958, 1963, and 1966 were analyzed to determine the frequency of usage of the concept terms employed by the American Industry Project. Nineteen-fifty-eight would be approximately five years prior to the first formal project in American Industry at Stout. Nineteen-sixty-three would be the first year of the project and 1966 would be three years later. Obviously one cannot claim that the efforts of the Project would have been the sole stimulus for the changes that may appear during these time periods. However, there is some logic in saying that the Project would have had some influence.

Table 2 presents a summary of the frequency with which the Project's concept terms were used in these three volumes. Over the three periods there is a marked increase in the use of the terms communication, production, materials and processes. Transportation, marketing and energy also increase but their total frequency of appearance is still relatively small. Finance and procurement are not used to any extent. In 1966 there was one reference to the Project.

In summary, there is a marked increase in the appearance of four of the Project's concept labels. Three others give slight evidence of increased usage. There appears to be some influence but it is difficult to estimate the extent of this impact.

Presentations Made by Project Staff Members

Another means of assessing the interest in the Project's activities is to review the requests received for presentations. Staff members have been invited to make presentations at four American Vocational Association Conventions, the 1969 American Education Research Association Convention and several of the American Industrial Arts Association Conventions. In addition a paper was presented at the Curriculum Program in Action: Their Administration and Evaluation Conference jointly sponsored by San Francisco State College and the University of Wisconsin. Presentations have also been made to a number of state level organizations and industrial arts groups such as the Western States Small Schools Project and the Integrated Career Selection Project. Several association of businessmen have also requested presentations. From the number of requests and the types of groups from which the requests were received it is obvious that

SUMMARY OF NEWSLETTER PAPER REQUESTS

	HIGH SCHOOL Ind. Arts		COLLEGE Ind. Arts Ind. Ed.		GUIDANCE	VOC-TECH SCHOOL	LIBRARY	OTHER	TOTAL
STATE	Instructor	Chairman	Instructor	Chairman	High School		College		
Oklahoma	1								1
Oregon	1		1				1		3
Pennsylvania	2	1		1		2		2	8
South Dakota				1					1
Tennessee	1			1					2
Utah			1						1
Virginia	1								1
Washington	1	2	2	1					6
West Virginia	1		1	1			1		4
Wisconsin	26						1	4	31
Wymoing	2							1	3
OTHER COUNTRIES									
Puerto Rico								1	1
Australia		1							1
Canda	2	1						1	4
TOTAL NUMBER	94	12	41	21	2	8	4	16	198
PERCENTAGE	47.4%	6%	20.7%	10.6%	1%	4%	2	8.1%	100%

TABLE 2

FREQUENCY OF USE OF AMERICAN INDUSTRY CONCEPT LABELS IN IAVE DURING 1958, 1963, and 1966

American Industry Concept Label	1958	1963	1966
Communication	9	8	32
Transportation	1	0	6
Finance	0	1	1
Property	0	12	0
Research	1	27	22
Procurement	0	0	0
Relationships	2	2	2
Marketing	0	0	2
Management	28	11	6
Production	22	16	78
Materials	46	29	152
Processes	14	15	130
Energy	0	0	2
Project referenced			1

the American Industry Project has attracted nation-wide attention from a number of high level groups. The positive reception of these presentations can be substantiated by the number of requests received for papers following the presentations and the fact that additional requests for presentations have ensued. These presentations have provided effective communications media for the Project and appear to have had a positive influence.

Summary

In review the response to the American Industry Project newsletter, the requests for presentations, and the increasing frequency of appearance of the Project's concepts in professional literature indicate that it has had a significant influence on the national scene. Since these references and requests were self-initiated, they indicate that a number of people throughout the United States are willing to attend to and seek information related to American Industry.

Krathwohl, D. R., Bloom, B. S., and Masia, B. B. Taxonomy of Educational Objectives: Handbook II, Affective Doamin. New York: David McKay Company, Inc., 1964.

Appendix O

STUDENT OPINIONS TOWARD AMERICAN INDUSTRY: LEVEL I

by

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March, 1970

American Industry Project
USOE Contract No. OE-5-85-060
Co-Directors:
Dr. Wesley L. Face
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Learning and Attitudes

Even limited experience with the teaching-learning process indicates that students with positive attitudes toward a course learn more readily. Positive attitudes no doubt make the course easier to teach and the content easier to study. In addition, positive attitudes developed in one course may influence the students' decisions related to electing to enroll in advanced courses in the program.

Fitzgerald and Ausubel (1963) suggested that the person with a positive attitude has a more definitive and stable cognitive structure. As a result, those with positive attitudes learn more readily and retain what they learn longer than those with negative attitudes. Several studies have reported (Frandsen and Sorenson, 1968; Edwards and Wilson, 1959; and Thorndike, 1944) a positive relationship between interests and school achievement.

Since empirical evidence existed to substantiate the relationship between attitudes and performance, the interest variable was included in the American Industry Project's evaluation. On the basis of the factors noted in the ensuing paragraph an instrument was selected to measure the participating students' attitudes toward their American Industry classes.

Several factors may give rise to attitudes toward a course. For example, Poffenberger and Norton (1959) concluded in their study of attitudes toward mathematics that success or failure in school had the major influence on attitude determination. These authors noted that success in a specific subject and the nature of the teacher both play a part in forming attitudes toward a course.

A study by Gaverick (1964) substantiated the findings of Poffenberger and Norton. Gaverick also found that initial ability was a substantial component of the relationship between course achievement and attitudes toward the course. He observed that when achievement levels were held constant a significant correlation between attitude and retention ceased to appear.

Students attitudes toward class may be caused by a number of factors. The students' experience with the course content and the teacher play a role. In addition, the student's peers may influence his attitudes. Also, the student's general attitude toward school will have some impact on his opinion of a specific course. Each of these factors was considered during the process of selecting the data collection instrument for this portion of the evaluation.

Data Collection

Instrument

The basic instrument used in this study was adapted (with permission of the authors) from one designed by Barker and Gump (1964). In the first part of the instrument, the responder was asked to list his favorite classes in rank order with the first class listed being the best liked.

In the second part, the student was asked to list in rank order the classes he disliked. The responder was also requested to record a reason for liking or disliking each class. In order to obtain additional information on the students' attitudes toward American Industry, a third section was included in the form originally designed by Barker and Gump. This section asked the students to specifically identify the aspects of American Industry they liked and disliked.

Egan (1966) ascertained the test-retest reliability of this instrument by administering it just prior to an Easter vacation break and again immediately after the students returned from vacation. This procedure minimized the opportunity for changes in attitudes as a result of school experiences and helped to delimit variations in responses to those caused by measurement error. The phi coefficient between the two sets of ratings was .94. Obviously, the ratings were very stable.

Administration and Data Analysis

Egan's study was based on a sample of the secondary schools cooperating with the Project during the 1965-66 academic year. Approximately 350 American Industry students were encompassed in this study. During the 1967-68 school year, Egan's study was replicated in 10 of the participating schools. This sample included 542 students, but it did not include all of the schools in Egan's study.

In both studies reasons listed for each of the courses evaluated and the comments on the specific likes and dislikes were scored using the categories given in Table 1.

Table 1

Response Categories for the Student Opinionnaire

Code	*Area*	*Dimension*
1a	*Teacher*	*Talent and general ability*
1b	*Teacher*	*Personality*
1c	*Teacher*	*Instruction*
1d	*Teacher*	*Discipline*
2a	*Subject*	*General Likes--Dislikes*
2b	*Subject*	*Utility*
2c	*Subject*	*Difficulty*
3a	*Activity*	*General Likes--Dislikes*
3b	*Activity*	*Utility*
3c	*Activity*	*Difficulty*
4	*Peers*	*Relations with*
5	*Working conditions*	*Quality*

The classes the students scheduled in addition to American Industry served as the control for the ratings of American Industry. By using the American Industry students' responses to other courses, the variation for general attitude toward school, teachers, and studying was controlled to a greater degree than using additional control groups. Also, intact classes were utilized in all schools. Thus, there was no guarantee that interest was a random variable in the evaluation groups.

Results

Egan's Study

Egan (1966) found that American Industry was identified as being "liked" significantly more times than the other courses taken by the students enrolled in the first Level American Industry course. Also, American Industry was listed in the "dislike" section fewer times than other courses. The major factors affecting attitudes noted by Egan in his study were the usefulness of the class, nature of the laboratory or learning activities used in the course, the utility of these activities, and competence of the teachers. Positive feelings on these factors, such as a competent teacher, led to "liking" American Industry. Negative feelings, such as lack of teacher preparation, tended to lead to "disliking" the course.

Replication

In 1967-68 the same instrument and procedures employed in Egan's study were utilized to assess the attitudes of a representative sample of students enrolled in the Level I American Industry course. Table 2 presents a summary of the percentage of responses identifying American Industry, English, mathematics, and science as being "liked" or "disliked'. Approximately 56% of the 542 students in the sample said that they liked American Industry. In contrast 21% said they disliked it. Another 22.3% did not list American Industry in either category and presumably were neutral in their feelings. Science received the next highest rating with 47.3% placing it in the "like" category, 19.2%"disliked" it, and 28.7% did not list it in either category.

Math was rated somewhat lower with 36.7% responding that they liked math, 31.6% said that they disliked it, and 32.6% did not list it as a like or dislike. English received the lowest ratings with 31.6% indicating that they liked English, 39.8% responded that they disliked it and 20% omitted it from their ratings.

A review of the values for each school given in Table 2 reveals considerable differences among schools. For example, the percentage of students liking American Industry varies from 35.8% to 94.4%. In only one school, however, did more students respond that they disliked American Industry than those who liked it.

An analysis of ranks based on these ratings with Friedman's two-way analysis of variance for ranks disclosed that the rankings for the four subjects in Table 2 varied significantly ($P < .01$). American Industry had the highest ranking, first in eight of the twelve schools and no rank below third. Science had the next highest ranking being ranked first in two schools.

TABLE 2

Per cent of Student Responses Indicating Likes and Dislikes for Major Classes in the Students' Course of Study: 1967-68

School	Course											
	American Industry			English			Math			Science		
	L	D	N	L	D	N	L	D	N	L	D	N
B	94.4	0	5.6	38.8	50.0	11.2	16.6	77.6	5.6	61.1	38.8	0
D	42.4	25.6	32.0	23.0	20.5	17.9	32.0	25.6	42.4	47.4	17.9	37.1
E	81.8	0	18.1	45.4	40.9	13.6	72.7	13.6	13.6	63.6	4.5	31.8
F	42.4	47.3	10.5	47.3	47.3	5.2	15.7	47.3	36.8	47.3	36.8	15.7
G	60.3	18.9	20.6	31.0	48.2	20.6	36.2	31.0	39.6	39.6	10.3	15.5
H	55.0	45.0	0	40.0	30.0	30.0	5.0	10.0	85.0	20.0	1.0	75.0
K	35.8	30.1	33.9	11.3	62.2	26.4	45.2	45.2	9.4	90.5	3.7	5.6
L	64.2	25.0	10.7	60.7	39.2	0	28.5	28.5	42.8	21.4	42.8	35.7
M	87.5	8.3	4.1	33.3	45.8	20.8	41.6	29.1	29.1	75.0	0	25.0
N	64.8	10.8	24.3	43.2	43.2	13.5	51.3	43.2	5.4	13.5	43.2	43.2
O	50.0	25.0	25.0	8.3	41.6	50.0	0	8.3	91.6	33.3	16.6	50.0
P	50.0	5.0	45.0	25.0	10.0	65.0	65.0	5.0	30.0	25.0	35.0	40.0
Totals	56.5	21.0	22.3	31.6	39.8	20.0	36.7	31.6	32.6	47.3	19.2	28.7

However, science was ranked fourth (last) in three schools. English had the lowest rankings.

Table 3 presents a summary of the responses made in part three of the opinionnaire. In this section of the instrument, students were asked to identify all of their likes and dislikes related to American Industry. Their responses were scored with the categories given in Table 1.

Activities in the course were mentioned most frequently (79.1%) as a part of the American Industry course that was liked. The second most important impact (25.6%) on liking American Industry was the nature of the subject. All other response categories contained responses from less than 10% of the students in the sample.

Working conditions formed the basis for the major dislike (37%) related to the American Industry courses rated. Dislikes associated with the nature of the course were listed by 35.9% of the respondents. Another 12.1% listed an aspect of instruction as a dislike. None of the remaining dimensions was identified by more than 10% of the students.

A review of Table 3 reveals considerable variation among the schools. For example, the quality of instruction was not mentioned in one school but was identified as a dislike by 44.4% of the students in school L. Similarly, dislikes related to the nature of the course were given by from 9.4% to 45.4% of the students in individual schools. Also, it should be mentioned that some students registered likes and dislikes in the same category. This was possible since students were asked to list their likes and dislikes without regard to specific aspects of the course. Thus, there is evidence that the classes were managed in varied ways and that instruction was carried out on several levels of quality.

On at least one dimension, quality of instruction, the responses indicated that this factor may operate in only one direction. While less than 1% gave this as a reason for liking the course,12.1% of all American Industry students listed this as a dislike. It is possible, however, that effective instruction is viewed in terms of the nature of the course or the quality of activities. Under this condition, quality of instruction typically would not be recorded as a "like".

The findings from Egan's study and the replication were used to modify the instructional materials, learning activities and suggest changes in instructional methods.

In summary, American Industry classes were identified as "liked" significantly more times then the other classes in the American Industry students' schedules. Major likes associated with American Industry were the learning activities and nature of the subject. The most frequently identified dislikes were working conditions, nature of the course and aspects of instruction.

TABLE 3

Distribution of Student Responses Indicating Specific Attitudinal Likes and Dislikes for American Industry, Level I: 1967-68

Responses	SCHOOLS													
	B		D		E		F		G		H		K	
	L	D	L	D	L	D	L	D	L	D	L	D	L	D
1a	5.5				9.0		9.8		4.7					
1b			.9		13.6				4.7				13.2	26.4
1c		5.5	.9	17.8	9.0			5.8		12.9		25		
1d				4.9				1.9						
2a	22.2	38.8	14.8	44.5	40.9	45.4	52.9	35.2	43.5	9.4	15.0	40	16.9	37.7
2b					4.5		19.6	9.8	2.3	1.1				5.6
2c								1.9				25		1.8
3a	88.8		69.3	2.9	95.4		76.4	11.7	69.4	3.5	80	5	86.7	1.8
3b			.9				29.4	5.8	15.2	1.1			1.8	
3c										1.1				
4	16.6	5.5	3.9	5.9	13.6		3.9	7.8	3.5	1.1		5	7.5	9.4
5		50.0	1.9	31.6	9.0	22.7	15.6	52.9	25.8	42.3		50		30.1
None		16.6	6.9	.9		40.9	21.5	27.4	24.7	44.7	20	15		
N	18		84		44		101		22		20		53	

TABLE 3 (Continued)

Distribution of Student Responses Indicating Specific Attitudinal Likes and Dislikes for American Industry, Level I: 1967-68

SCHOOLS

Responses	L		M		N		O		P		% of Total[a]	
	L	D	L	D	L	D	L	D	L	D	L	D
1a	3.7		4		3.5				2.2		3.3	0
1b	3.7		4		1.1				2.2		3.5	2.5
1c		44.4		16	1.1	8.3		8.3		9.0	.7	12.1
1d		3.7	4			1.1			2.2		.3	1.4
2a	18.5	59.2	12	44	16.6	38.0	25	41.6	22.7	34.0	25.6	35.9
2b	3.7		12		1.1		8.3		18.1	2.2	4.9	1.8
2c				12	1.1						.1	1.8
3a	88.8		68	4	82.1	4.7	100		90.9	136	79.1	4.6
3b							16.6		11.3	2.2	6.6	.9
3c					1.1					2.2	.1	.3
4	7.4		8	8		5.9	8.3		9.0		6.4	4.6
5		44.4	4	36	1.1	23.8	16.6	58.4	4.5	40.9	7.3	37
None					11.9	34.5					9.7	17.8
N		27	25		85		51		12		542	

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a Percentages may total more than 100 since some students made several comments.

References

Barker, R.G. and Gump, P.V. Big school, small school. Stanford: Stanford University Press, 1964.

Biddle, B.J. and Ellena, W.J. (ed.) Contemporary Research on Teacher Effectiveness, New York: Holt, Rinehart, and Winston, 1964.

Edwards, A. and Wilson, A. B. "The Association between interest and achievement in high school chemistry." Educational and Psychological Measurement, 1959, 19, 601-610.

Egan, E.M. A study of Student Attitudes in American Industry. Unpublished masters paper, Stout State University, 1966.

Fitzgerald, D. and Ausubel, D.P. Cognitive versus affective factors in the learning and retention of controversial material. Journal of Educational Psychology, 1963, 54, 73-84.

Frandsen, A. and Sorenson, M. "Interests as motives in academic achievement." Journal of School Psychology, 1968-9, 7, 52-56.

Gaverick, C.M. Retention of school learning as influenced by selected affective tone variables. Journal of Educational Psychology, 1964, 55, (1), 31-34.

Poffenberger, T. and Norton, D. Factors in the formulation of attitudes towards mathematics. Journal of Educational Research, 1959, 52 (5), 171-180.

Thorndike, E.L. "Interests and abilities." Journal of Applied Psychology 1944, 28, 43-52.

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APPENDIX P

THE AMERICAN INDUSTRY PROJECT

by

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Co-Director
American Industry Project
Stout State University

Text of a Speech Delivered at the American
Vocational Association Convention in Denver.
December 8, 1966

American Industry Project
USOE Contract No. OE-5-85-060
Co-Directors:
Dr. Wesley L. Face
Dr. Eugene R. F. Flug

THE AMERICAN INDUSTRY PROJECT

AVA Convention - Denver - December, 8, 1966

Eugene R. F. Flug
Stout State University
Menomonie, Wisconsin

There have been many reactions to the American Industry Project since its beginning in 1962, so perhaps I should dispel some of the misconceptions that have come about as the result of the tendency for the practitioner to leap to unwarranted conclusions.

American Industry is not just a patch on the old industrial arts curriculum. It is not "a shop taught without tools" as a Milwaukee paper once headlined. It is not ignoring appropriate skill development. It is not intended for the gifted student alone, nor is it only for boys. It is not intended to introduce a national, univariate curriculum into our schools. It is not a program designed by social studies specialists in order to gain more time in the school curriculum. It is not an ivory tower approach to curriculum building. And finally, it is not represented as the only approach, nor the final answer to all of the problems of industrial arts and vocational education.

What then, is American Industry? -- That was one of the Project's first questions and the focus of our inquiry. In order to help you understand our project it is necessary for us to examine together the basic ideas upon which our efforts have been predicated.

So much has been written and spoken about change I'll merely note in passing that this is accepted as a root cause of the need for increasing and continuing attention for curriculum work.

Two major ideas have guided the recent efforts of curriculum makers and must be understood if the American Industry Project itself is to be understood. These are the idea of "concept" and the idea of "structure." Let us examine each of these ideas in turn.

I've found that one of the best ways to gain an insight into what a concept is, is to look closely at a concept which is held to some degree by everyone. Recall how, from your earliest days, your mother shaped your understanding of the importance of certain events by using such phrases as: "It's bedtime", "suppertime", "tomorrow", "sometime", "it's time to get up", "hurry up", "you're late for school." When you grew older and obtained your first job you found that an hour had monetary value; you might forget your birthday, but your wedding anniversary, never! And if you hadn't learned that childhood lesson of rising early you'd occasionally miss the bus to work. When the job became routine, Friday came to have special significance. If you used a camera, you discovered that a fraction of a second became important. Only recently the radioed report "one more orbit to re-entry" became commonplace. The concept of time, one of our most abstract concepts, is held to varying degrees by everyone. If we look back on the lessons through which we learned this important concept, the nature of a concept and of concept learning may be seen.

Very briefly concepts may be held at various levels of understanding; they are formed through a variety of experiences; they are expressed in words or other symbols but the concept is much more than just the word itself, therefore mere verbalization is not the best evidence of knowledge of a concept. A concept may be likened to a categorization system of related knowledges, and the concept term - a kind of flag indicator in the mind. The working definition which we have built from many sources defines a concept as "a psychological construct resulting from a variety of experiences (and detached from the many situations giving rise to it), fixed by a word or idea, and having functional value to the individual in his thinking and behavior."

The transfer power of conceptual thinking represents a basic reason for its emphasis in curriculum building.

If you link your concept of time to the concept of distance, for example, much meaning can be attached to other understandings. An example of the power of conceptual thinking could be seen in the laboratory of a conceptual teacher introducing the concept of skill to a student. His emphasis, rather than teaching only the steps of an operation would be on the skill learning process itself. He would indicate the importance of following a good model performance; analyzing the skill for its constituent elements; comparing each step of performance with the model; and the need for supervision until the learner has reached the point of integration and performed the skill successfully. The learner would record the results of his practice and compare with other learners the results of massed practice verses spaced practice. In short, the conceptual teacher, when teaching skills, would guide his student so as to help him to become a skills learner, not just the learner of isolated skills.

We have on our staff, teaching laboratory courses to our college students in American Industry, a talented young man from East Cleveland. Doug Stallsmith taught at Shaw High School and with two others, developed a fine technology program which was conceptually oriented. In his approach to teaching machine technology, Doug had defined a machine as, "a device which through movement, applied forces which made use of mechanical advantages to produce work." By examining each of these attributes of the concept of machine the students were able to make learning transitions from one machine to another with considerable facility. They were able to go beyond the machine as it stood in the shop, and adapt it to processes within the capability of the machine, but for which it had not been designed. "They were able to not only analyze the machine but improve upon it."

Through their analysis of machine motions along the XYZ axes Mr. Stallsmith's students were able to automate a radial arm saw in a production problem. The only manual step in the particular operation automated involved feeding a piece of stock to a limit stop. A tape recorder informed the operator of each step as it was performed. From the speaker mounted at the work station would come the instructions: "Advance stock to limit stop; air vise closes, linear table moves into position; saw turns on; saw moves through stock; blade returns; saw turns off; linear table returns; air vise opens; stock is ejected onto conveyor." These separate actions were triggered by a tone on the tape which was detected by an oscillator which in turn tripped a rotary table which had been rigged as a distributor. An oscilloscope was hooked into the control equipment to show the difference in wave patterns of the voice and actuating signals.

Earlier in your reflections upon the formation of your concept of time it was apparent that it had been developed in an informal, largely unplanned manner, and concepts do develop in this way. It is the task of the school, however, to identify important concepts to be learned and then to plan for the deliberate development of these concepts in the school provided setting.

The second major idea about which curriculum makers are concerned is structure. Very simply, structure is concerned with the parts of an object and the ways in which they are interrelated. The structure of a house could be seen in the ways the floors, walls, roof, windows, doors, and other parts are arranged. The structure of a molecule would be revealed by its atomic arrangements. A curriculum structure can be seen in the vertical and horizontal arrangement of the various subjects and educational activities.

Vast quantities of seemingly disparate data are difficult to comprehend; therefore, if an apparent logical structure is lacking, man imposes an organization upon that data in order to better understand it. A pile of 2 x 4's of apparently random lengths has little meaning, but when arranged into the framework of a house, the formerly confused mixture of lengths assumes an integrated meaning.

The ordering of knowledges within a given body of knowledge is known as structuring a discipline and affords man the meaning he strives for by providing simplicity and revealing relationships. By comparing new knowledge with his structure he may experience discovery. If the knowledge fits his structure he has added to his understanding of the structure, if it does not fit perhaps he must restructure his knowledge. In other words, that random assortment of 2 x 4's might conceivably fit as well, or better, into another structure. This does not negate the value of the earlier structure, for without it he may not have learned of the newer structure.

To speak of structuring the same knowledge differently may confuse you, and believe me, structuring a body of knowledge is not a simple task. Most of the other disciplines under reform already possessed an identified body of content which has since been restructured. In developing American Industry, however, we were faced with that pile of mixed up 2 x 4's.

How does one go about structuring a "new" body of knowledge? We certainly could not simply look for relationships among the knowledges typically taught in industrial arts. Taken all together they were not representative of a unified body of knowledge. Too much was left out and too many random bits of knowledge were included. How could all of the hundreds of tools, or materials, or specific industries be represented in our schools? What rationale could possibly justify the inclusion of some and the exclusion of others?

How indeed, does one go about structuring a "new" body of knowledge? As in all curriculum work it was necessary to start with objectives in order to determine an initial direction and identify the limitations of the task.

At Stout we accepted but two of the objectives of industrial arts as the objectives for the American Industry Project. These objectives are:

1. To develop an understanding of those concepts which directly apply to industry.

2. To develop the ability to solve problems related to industry.

With our objectives providing orientation the major task of defining the discipline had to be faced. Was industry a discipline? Could its knowledges be ordered into a meaningful structure? Industry as an entity, a unified whole, was represented nowhere in the school curriculum, although bits and pieces of it appeared in social studies, science, math, English, and yes, even in industrial arts.

We approached the task of structuring the discipline of industry based upon a review of literature in the area of concept learning. Pooling the experience of some of the interested staff at Stout we first defined industry in broad terms to identify the possible scope of our investigation. The definition we have accepted holds industry to be an "institution in our culture which, through the application of knowledge and the utilization of men, money, machines, and materials, produces goods or provides services to meet the needs of man, and which results in a profit for the institution or society." This definition is admittedly broad but we depended upon our conceptual annalysis technique to help us categorize the knowledges of industry so as to reduce them to comprehensible terms. In making our conceptual analysis of this broadly defined body of knowledge we first posited a tentative model to represent an initial, categorical breakdown of the knowledges. This model was then used as a "tool of inquiry" to be continually revised and improved as the literature and experts in industry were consulted. Applying our conceptual definition to the literature on industry we would try to fit the knowledges identified within the categories first established in our model. As data was accumulated, and commonalities appeared, sub-categories were established, each of which, in turn became a model substructure to be tested. Some, it was found, could be combined under an emerging master concept. Each change brought us closer to an intergrated understanding of industry.

It is important to emphasize here that we were structuring the body of knowledge of industry using a conceptual analysis technique. This does not presume a curriculum structure nor does it necessarily impose a particular teaching methodology. If we were to look at our communication model in its broad sense, we would see that any communication is made up of a source, message, channel, receiver, depends upon feedback, and is hampered by interference. If enough of the sense of each of these subconcepts is grasped the learner, in applying this total model to new situations increases his total understanding of communication. He does not have to know everything about all of the subconcepts in order to make use of the model. If he learns enough of the structure of this concept to establish categorical scope and limitations he has a powerful fool of enquiry.

The early overall structure of industry, although somewhat naive did provide a way of gaining knowledge of our subject and improving our study techniques. We have consulted with over 100 knowledgeable people in industry and education of the West Coast and in the Midwest and applied their insights to our model structure. We will be talking to consultants on the East Coast and in the South this year.

We are trying to build a theoretical structural model of which we will be able to say, "This is the best we've been able to do up to now," but which we can also say will be adaptable to change. The function of the theoretical model is to enable us to continue to ask the kinds of questions that permit us to discover significant changes in the discipline. This approach clearly recognizes the revisionary character of knowledge.

Utilizing this structure we are attempting to develop three levels of courses, to begin in the eighth grade. The broad objectives for the first level are (1) to develop a knowledge and understanding of the major concepts of industry and their relationships, and (2) to develop the ability to solve simple problems related to industry. This first course is intended to establish that broad form of reference to which the student can relate other learnings. As he confronts these other learnings he will be encouraged to match them against this framework, in much the same way as we have developed our theoretical structure. He will, in a sense, become an applier of our logical, theoretical structure in the development of his own psychological structure. The approach for this first course is therefore cyclical in nature, emphasizing the total unity of knowledges of industry and we hope, here, to communicate the excitement and importance of industry.

At the second level of American Industry our purposes are to (1) develop in-depth understanding of the concepts of industry, and develop refined understandings of the relationships among the concepts, and (2) expand the ability to recognize and solve complex problems related to industry. At this level considerably more attention is devoted to study of each of our concept areas as an entity in itself with some less attention continuing to be placed upon interrelationships between content areas. This suggests less emphasis upon the cyclical approach, although an integrated experience should be provided here, too.

Level III would be concerned with the development of knowledge and problem solving skills within a concept area or cluster of concept areas appropriate to the individual's level of ability and interests. The student would be expected to identify a problem area of significance involving one or more concept areas. With the help of an advisor he would plan his approach to the problem and develop his search and solution on a largely independent basis utilizing other subject matter specialists as resource people. In this work he would be encouraged to use any and all resources available to him in the school and in the community.

I have spent the greater portion of the time allotted to me in describing our basic rationale and method of inquiry, because without a clear understanding of the underlying basis for our project, description of the mechanics of the project implementation might be of interest but would have less meaning. To put it in contemporary terms, if our guidance system is unreliable, or firmly locked on the wrong star we may never get into orbit.

Now for a quick look at the Project organization and progress. In 1962 a number of staff members at Stout began a series of informal discussions regarding the conditions of the field of industrial arts, which led to a small grant from the U.S. Office of Education. This was used to release Wes Face part time to review the literature on concepts and concept learning. A year's meetings of the staff working on the initial structure resulted in a Ford grant for a one year period to begin implementation and further development of our ideas in the classroom. Ten teachers from Wisconsin and Minnesota were brought onto campus for the summer to refine the structural model and develop a resource file for teaching. Production of materials was done in a dormitory laundry room. We even took time to get acquainted. That fall the teachers began to implement developmental first courses on a tryout basis in classes from grades 7-11. Based on these experiences a proposal was submitted to the U.S. Office of Education for funding over a four-year period to meet the following program objectives: (1) to complete the development of the American Industry curriculum leading into vocational preparation; (2) to complete the preparation of teaching materials for the American Industry curriculum; (3) to establish at Stout State University a resource center for the American Industry curriculum; (4) to conduct a pilot teacher education program parallel to the developing secondary curriculum, as a basis for a recommended teacher education curriculum; (5) to continue a series of institutes for the preparation of in-service teachers; and (6) to promote research on related problems.

We now have twenty-three teachers at seventeen participating centers and two cooperating centers, with about 1600 students involved. Roughly half of these are in American Industry classes and half are serving in control groups. Data are being accumulated on all these students with comparisons planned with Project TALENT's data to find if our results may be more broadly generalizable. A written test is being completed, to be administered this year in industry as a validation check on our theoretical structure and our curriculum structure.

Our resource file is growing as a result of our early contacts with over 1500 industries. We have generated seven paperback student booklets for use in the first level along with a teacher's guide. Five of our teachers are teaching second level American Industry on a developmental tryout basis this year. It is planned to introduce standardized materials at second level next year, and begin a third level course on a developmental basis. Our teachers (all industrial arts teachers) range in experience from one to thirty-five years of teaching, our centers are representative of a range of socio-economic levels from urban culturally disadvantaged areas and low income small rural schools to the opposite extremes. Our students exhibit similar variability.

We have twelve pioneering students (of whom three are girls) enrolled in a pilot teacher education program and who will be certified as American Industry teachers when they graduate in 1969.

Our professional staff (all former industrial arts teachers) consists of two co-directors, a research specialist, a teacher education specialist, an instructional media specialist, a curriculum specialist and a coordinator of participating centers. We also have nine research assistants on part time assignments and four overworked secretaries. The university has, in addition provided us with one and one-half laboratory teachers and a micro-teaching coordinator for the teacher education program.

We do have some problems which need attention. These include: (1) improving the design of activities for the teaching of concepts introduced at each level; (2) improving the backgrounds of our participating teachers; (3) providing answers to the school administrators and teachers who want American Industry now.

I'll close on a more positive note than I began by summarizing what the American Industry Project is.

The American Industry Project is a new curriculum area designed by industrial arts teachers to provide a better answer to teaching industry; it is using the laboratory as a tool in making concepts meaningful; it is trying to provide an integrated body of content in an attempt to solve the riddle of articulation between general and vocational education; it is concerned with providing a structure of knowledge for industrial arts teachers; it is appropriate for all levels of ability in our secondary schools; it is for all boys and girls in secondary schools; it is involved with local schools, administration, teachers, and students, (and has been since its inception); and finally, it is both developmental and experimental.

With the knowledge explosion and the accompanying dizzying pace of change we as educators are engaged in competition, a competition for the minds of youth. I'm hopeful that the American Industry Project has something of substance to offer.

APPENDIX Q

TEACHER MODEL

A MODEL TO GUIDE CURRICULUM DEVELOPMENT FOR THE AMERICAN INDUSTRY PROJECT

by

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Teacher Model

One phase of the American Industry Project is the development of a pilot teacher education program for teachers of American Industry. To enable the Project to carry out this development, it seemed logical to determine what the end product,or teacher, should be like and then build a curriculum which seemed likely to succeed in developing the sort of teacher desired.

Since there was not an adequate precedent for the type of teacher we wanted to prepare, some sort of decisions had to be made about the kind of teacher needed before development of a curriculum could proceed. Thus, it became necessary to build a teacher model, or guide, for the development of a curriculum.

The teacher model was not conceived of as an original development, nor was it intended to project a stereotype model teacher. It is a structuring of available information into a form which provides guidance for curriculum development. The model is flexible and intended to provide for change as additional data is brought into it.

Two sources were used for the collection of our data: A review of literature and interviews.

The data were sorted into four cells.

1.1 Modifiable - supported by opinion.
1.2 Modifiable (under typical classroom conditions) - supported by data.
2.1 Non-modifiable - supported by opinion
2.2 Non-modifiable (under typical classroom conditions) - supported by data.

		Supported by data 2
Modifiable 1		
Not Modifiable 2		

In many cases different instruments were used in several studies relating to a given point of view. This raised the question of whether the several instruments were, in fact, getting at the same thing.

The question was resolved as well as possible by analyzing the instruments involved and the inferences drawn from it. If the instruments and inference were consistent, then the dimension they represented was adapted in an approriate cell.

In the general sense, three types of criteria were found to have been used in the data which was collected; student gain, rater evaluation, and logical argument. The first two criteria were considered as offering support to a dimension through empirical data; the last, logical argument, was considered as offering support through opinion. Precedence of validity was given to these three criteria in the following order: (1) Student gain, (2) rater evaluation, and (3) logical argument.

Where the collected data were not consistent, precedence was given to data representing the above criteria, in the order given. In each such case, attention was given to the design of the study, the appropriateness of the conclusions, and the appropriateness of the statistics used. Consideration was also given to the relevance of the logical argument. As these conflicts of internal consistency were resolved in favor of a given point of view, it was taken as a teacher dimension, supported by empirical data or opinion, depending upon the outcome of the resolution. If there was no agreement or if the weight of evidence did not substantially support one point of view, then the dimension was not included, or it may have been included as supported only by opinion if there was considerable body of consistent opinion and only a little research. A dimension may be included on the basis of support by opinion alone.

Within both classifications, supported by opinion and supported by empirical data, there was a classification by modifiability. That is, modifiable or not modifiable.

Modifiable implied that the dimension was one which might be attacked directly with some hope of success by some typical educational processes directly under the control of a teacher within the university. Knowledge of subject matter is a dimension of this classification.

Not modifiable implied those teacher dimensions which may not be predictably affected by the direct actions of a teacher under typical conditions. The various personality characteristics are dimensions of this classification.

This illustration shows the model with a few of the dimensions in place.

	Supported by opinion 1	Supported by data 2
	1	2
Modifiable 1	1.1.1 Has consistent philosophy 1.1.3 Relates to school and community 1.1.8 Acceptable personal appearance	1.2.2 Can establish set 1.2.3 Uses appropriate forms of reference 1.2.10 Has broad cultural interests 1.2.13 Knows his subject
Not Modifiable 2	2.1.1 Acceptable physical appearance 2.1.2 Acceptabtable societal model	2.2.2 Is flexible 2.2.4 Good intelligence 2.2.5 Energetic

This classification system permits both a rational classification of existing information and facilitates the storage and retrieval of new information by cell code, number, and letter subscripts. If new data supports or rejects a given dimension, this may be recorded on the classification by a + or −. This permits the revision of teacher dimensions as additional data becomes available. This is an on-going procedure. Dimensions may be added, eliminated, or relocated with ease. Because of the limited amount of data available concerning some of the dimensions, their present location may be rather tentative.

In the following pages, the classification of the teacher dimension is indicated at the left on each page. At the right of each dimension number is the description of the dimension. The reference to research or opinion supporting its classification is below the description. In the case of some dimensions, consensus was arrived at locally; in these cases there is no reference below the description of the dimension. In all cases, the references given describe or clarify the dimension. They do not represent all of the data available for that dimension.

CELL 1.1

(Consensus -- Modifiable)

1.1.1

Has Consistent Philosophy

This dimension implies that a teacher, as a person, ought to have a constructive code of ethics and a philosophy.

Reference: Haskew, 1956, P. 199.

1.1.2

Involves Self in Schoolwide Activities as Appropriate

This dimension implies that a teacher should "provide professional leadership in extracurricular class activities which are an important part of the learning environment of the school."

Reference: Perters, Burnett, and Farwell, 1963, P.55.

1.1.3

Relates School to Community

This demension implies that the school may use both the human (parents, policemen, doctors) and physical (newspaper offices, fire house) resources of the community.

Reference: Hansen, 1957, P. 308-312.
Holman, P. 183.

1.1.3.1

Has support with industry in the community (local consensus).

1.1.4

Relates Curriculum to Society

This dimension implies that "the school itself shall be made a genuine form of active community life, instead of a place set apart in which to learn lessons."

Reference: Dworkin, 1959, P. 39, 45.

1.1.5

Involves Self in Community or Supra Community Activities as Appropriate

This dimension implies that a teacher, as a citizen of a community, has certain obligations, such as voting.

Reference: Peters, Burnett, and Farwell, '63, P. 65.

1.1.6

Perceptive of Change

Reference: Public Schools of Baltimore County, 1953, P. 266.

1.1.7

Perceptive of World About His

This dimension may imply an "understanding of the physical world and man's relation to it."

Reference: Haskew, 1956, P. 199.

1.1.8

Has Acceptable Appearance

This statement refers to such things as one's clothes and hair style which should be neat and fairly conservative.

Reference: Badley and Keith, 1924, P. 319.
Holliday, 1952, P. 10.
Wynn, 1960, P. 232.

1.1.9

Can Conduct Action Research

"The teacher has a definite obligation to engage in research . . . The curiosity of man and especially pupils can be enhanced by research about them and with them."

Reference: Peters, Burnett, and Farwell, 1963, P. 361.

1.1.10

Can Aid in Vocational Guidance

Reference: Peters, Burnett, and Farwell, 1963, P. 52.

1.1.11

Knows School Finance and Administration Procedure and School Law

Reference: Armstrong, 1952, P. 15.
Metropolitan School Study Council, 1950, P. 14, 18.

1.1.12

Knows Social Structure of the Community

This dimension implies a "familiarity with the social and institutional structure of the community, the forces at work there and the relationships between the school and the community."

Reference: Haskew, 1956, P. 201.
Metropolitan School Study Council, 1950, P. 13.

1.1.13
Broad Background in Liberal and General Studies

This dimension implies that such a background is necessary to prepare individuals to deal intelligently with the problems arising from living in a democratic society.

Reference: Gould and Yoakam, 1954, P. 4, 33-34.

1.1.14
Committed to Life of Learning

(Local Consensus)

1.1.15
Effective Written Communication

This dimension implies that as an educated person, a teacher must have skill in written communication.

Reference: Haskew, 1956, P. 199.

1.1.16
Can Teach at all Conceptual Levels

(Local Consensus)

1.1.17
Good Housekeeper

This dimension implies that the ordinary classroom, and especially an industrial arts classroom, should be neat. Students must also be taught how to care for equipment and materials.

Reference: Solvidge and Fryklund, 1930, P. 41.
Butler, 1939, P. 303.

CELL 1.2

(Supported by data -- modifiable)

Dimension No. Description

1.2.1

Can change from an authoritarian to non-authoritarian teaching mode as necessary

Reference: Biddle, Ellena, P. 219-220.
Cage, Handbook of Research on Teaching, 1963, P. 427, 429.

1.2.2

Establishing Set

The term set refers to the establishment of cognitive rapport between pupils and teacher to obtain immediate involvement in the lesson. Experience indicates a direct relationship between the effectiveness in establishing set and effectiveness in the total lesson. If the teacher succeeds in creating a positive set, the likelihood of pupil involvement in the lesson will be enhanced. For example, one technique for inducing positive set is through the use of analogies that have characteristics similar to the concept, principle, or central theme of the lesson. By training interns in set induction procedures and having them apply these procedures in microteaching sessions, their subsequent classroom teaching is significantly improved.

Reference: Bush and Allen, 1964, Allen and Fortune, 1964.

1.2.3

Establishing Appropriate Frames of Reference

A student's understanding of the materials of a lesson can be increased if it is organized and taught from several appropriate points of view. A single frame of reference provides a structure through which the student can gain an understanding of the materials. The use of several frames of reference deepens and broadens the general field of understanding more completely than is possible with only one. For example, the Emancipation Proclamation becomes more meaningful to the student when it is understood from the frames of reference of the Northern White abolitionist, the Southern White, the Negro slave in the seceded South, the free Negro, the European clothing manufacturer, the political leaders of England, and as an example of the reserved powers of the American President, than if it is simply discussed as the document issued by Lincoln which freed the slaves.

Reference: Bush and Allen, 1964, Allen and Fortune, 1964.

1.2.4

Achieving Closure

Closure is complementary to set induction. Closure is attained when the major purposes, principles, and constructs of a lesson, or portion of a lesson, are judged to have been learned so that the student can relate new knowledge to past knowledge. It is more than a quick summary of the ground covered in a lesson. In addition to pulling together the major points and acting as a cognitive link between past knowledge and new knowledge, closure provides the pupil with a needed feeling of achievement. Closure is not limited to the completion of a lesson. It is also needed at specific points within the lesson so that pupils may know where they are and where they are going.

Reference: Bush and Allen, 1964, Allen and Fortune, 1964.

1.2.5

Using Questions Effectively

The ability to ask provocative, answerable, and appropriate questions, and thus to involve pupils actively, is one of the critical skills in teaching . . . [Novice teachers tend to ask questions which are either so general as to be vague and impossible to answer satisfactorily or so specific that they require a one-word "fill-in" response, which tends to kill further responses.] . . . helps to build proficiency in preparing and using questions; factual, conceptual, thought-provoking, discussion-stimulating, heuristic questions.

Reference: Bush and Allen, 1964, Allen and Fortune, 1964.

1.2.6

Recognizing and Obtaining Attending Behavior

The successful experienced teacher, through visual cues, quickly notes indications of interest or boredom, comprehension or bewilderment. Facial expressions, directions of the eyes, and tilt of the head, and bodily posture offer commonly recurrent cues which make it possible for the skilled teacher to evaluate his classroom performance according to the pupil's reactions. He can then change his "pace," vary the activity, introduce new instructional strategies as necessary, and improve the quality of his teaching.

Reference: Bush and Allen, 1964, Allen and Fortune, 1964.

1.2.7

Control of Participation

Control of pupils' participation is one important variable in the successful learning for the pupils . . . Teachers develop different techniques for encouraging or discouraging classroom interaction and to gain insight into the casual relationship between a series of teacher-pupil interactions. When a teacher develops the skill to analyze and to control the use of his accepting and rejecting remarks, his positive and negative reactions, his patterns of reward and punishment, he has taken a major step toward effective teaching.

Reference: Bush and Allen, 1964, Allen and Fortune, 1964.

1.2.8

Providing Feedback

The feedback process . . . may be simply stated as providing "knowledge of results." Teachers often ignore the availability of information accessible during the lesson. Questioning, visual cues, informal examination of performance, are immediate sources of feedback.

Teachers can develop appropriate techniques to elicit feedback from students to modify their lesson accordingly. Teachers unconsciously tap a variety of feedback sources but unless they are sensitized, they tend to rely unevenly on a limited number of students as "indicators" and to rely on a restricted range of feedback cues.

Reference: Bush and Allen, 1964, Allen and Fortune, 1964.

1.2.9

Employing Rewards and Punishments (Reinforcement)

Reinforcing desired pupil behavior through the use of reward and punishment is an integral part of the teacher's role as director of classroom learning. Substantial psychological evidence confirms the value of reinforcement in the learning process. The acquisition of knowledge of specific techniques of reward and punishment and the development of skill in using them appropriately in specific situations is most important.

Reference: Bush and Allen, 1964, Allen and Fortune, 1964.

1.2.10

Has Broad Cultural Interests

This dimension implies interest and participation in the arts, music, painting, reading and literary matters.

Reference: Ryans, 1960, P. 360.
Biddle, Ellena, 1964, P. 91.

1.2.11

Stimulating, Imaginative

Reference: Biddle, Ellena, 1964, P. 91.
Ryans, 1960, P. 389.

1.2.12

Professionally Oriented

This dimension is often evaluated by raters. This usually refers to professional activity and knowledge, leadership and activity in oral professional organizations, and attitudes toward the profession.

Reference: Barr, 1961, P. 97-98.

1.2.13

Knows His Subject

This dimension is often evaluated interms of college grades obtained, and/or ratings of one sort or another.

Reference: Biddle, Ellena, 1964, P. 219-220.
Barr, 1961, P. 69, 97-98.

CELL 2.1

(Consensus -- Non-modifiable)

2.1.1

Acceptable Physical Appearance

Students often react strongly to the appearance of a teacher. It can be an asset or a liability. Does the teacher have characteristics that are likely to be drawbacks to his acceptance; too thin, too fat, unusual facial contours, large hands or feet?

Reference: Garrett, 1964, P. 4.

2.2.2

Acceptable Societal Model

This dimension implies that a teacher must be a good example, a model for his pupils. This responsibility makes a teacher continually conscious of the impact of his behavior on his students.

Reference: Chandler, 1961, P. 231.
Gould and Yoakam, 1954, P. 5.

CELL 2.2

(Supported by data -- Non-Modifiable)

2.2.1

Open-minded

As the belief and disbelief system becomes closed, the isolation between and within the belief and the disbelief system increases. As closedness increases, there will be less differentiation of disbelief subsystems with respect to each other -- different disbelief subsystems will be perceived as the same. It is assumed that to the degree that the system become closed, the content of such beliefs holds that we live alone, helpless, friendless, with an uncertain future; that the self is unworthy and inadequate, and that the way to overcome such feelings is by self-aggradizing, self-righteous identification with a cause and concern for power and status.

The more closed the system the more authority will be seen as absolute and people will be accepted and reputed because they agree or disagree with our belief-disbelief system.

The more one will rely upon authoritarian dictates to determine beliefs, the higher will be our tendency to avoid contact with facts, events, etc., incongruent with one's belief-disbelief system.

Reference: Rokeach, 1960, P. 73-80.
Gage, 1963, P. 547-548.

2.2.2

Flexible

"Perseveration effects are not necessarily associated with any morbid process or with any particular character trait . . . If a person has the intellectual capacity for appreciating the consequences of his own determining tendencies and persists toward his goals despite blockage or deviation, we say that he is determined. When there is a lack of elasticity and adaptiveness with respect to other inhibiting and facilitating factors, determination becomes inflexibility." (Lendes, Bolles, 1950, P. 507).

. . . to the extent that a person is said to be characteristically rigid [inflexible] his analytic thinking should suffer . . . He cannot break down or overcome beliefs when they are no longer appropriate, in order to replace them with more appropriate ones . . . Persons high in rigidity should have greater difficulty in the analytic phase of problem solving than those persons low in rigidity. (Rokeach, 1960, P. 183, 185).

Reference: Biddle, Ellena, 1964, P. 95.
Barr, 1961, P. 97-98.

2.2.3

High MMPI K Scale

The MMPI K Scale seems to measure such traits as:

References: Gage, 1963, P. 540-541.
Biddle, Ellena, 1964, P. 87.
Barr, 1961, P. 97-98.

2.2.3.1 Responsible
2.2.3.2 Controlled (Gage, 1963, P. 424.)
2.2.3.3 Conscientious
2.2.3.4 Good interpersonal performance
2.2.3.5 Strong ego (Gage, 1963, P. 424.)
2.2.3.6 Friendly (Gage, 1963, P. 547-48.) (Ryans, 1960, P. 389.)
2.2.3.7 Adapts to needs of others
2.2.3.8 Conforming

Collectively, many of these attributes seem similar to the:

2.2.3.9 Warm helping attitude identified by some other devices

Reference: Gage, 1963, P. 547-48, 477.
Barr, 1961, P. 97-98.
Ryans, 1960, P. 389.

2.2.4

Has Good Intelligence

In the sense that intelligence is used here it refers only to academic performance and is usually evaluated in terms of grade point averages, ACT scores, or similar devices. "Good" generally is relative i.e. "A" grades are "better" than "C" grades or high ACT scores are "better" than relatively lower ones.

Reference: Barr, 1961, P. 69, 81.

2.2.5

Energetic

This dimension is characterized by a liking for a rapid pace rather than a slow, deliberate one -- quickness of action, production, and efficiency.

Reference: Gage, 1963, P. 548-549.
Barr, 1961, P. 97-98, 86.

2.2.6

Has Initiative

References: Gage, 1963, P. 547-48
Barr, 1961, P. 69.

Reference: Gage, 1963, P. 547-48.
Barr, 1961, P. 69.

2.27

Has Participated in School-like Activities

This dimension includes such activities as playing school as a child, reading to younger children, youth camp counseling, and similar activities.

Reference: Barr, 1961, P. 17.
Biddle, Ellena, 1964, P. 81.

2.2.8

Highly Verbal

This dimension refers to the ability to call up many ideas in a situation relatively free from restriction.

Reference: Guilford, 1959, P. 382.
Knoll, 1956.
Coombs, 1965, P. 102.

2.2.9

Dominant

This dimension indicates a tendency to control the situation.

Reference: Hughes, 1959.
Barr, 1961, P. 97-98.
Gage, 1963, P. 547-548.

REFERENCES

1. Allen, D. W., Fortune, J. C., An Analysis of Micro-Teaching: A New Procedure in Teacher Education, Stanford University School of Education, mimeo, 1964.

2. Armstrong, A., Your New Job. Curriculum Bulletin, Eugene: University of Oregon, 1952, No. 109.

3. Badley, W. C., and Keith, J. A. J., An Introduction to Teaching, New York: MacMillian Co., 1924.

4. Barr, A. S., et. al., The Measurement and Prediction of Teacher Effectiveness: A Summary of Investigation, Dembar Publications, Inc., 1961.

5. Biddle, B. J., Ellena, W. J., Contemporary Research on Teacher Effectiveness, Holt, Rinehart, and Winston, Inc., 1964.

6. Bush, R. N, Allen, D. W., Micro-Teaching Controlled Practice in the Training of Teachers, Paper presented at the Santa Barbara Conference of Teacher Education of the Ford Foundation, mimeo, 1964.

7. Butler, F. A., The Improvement of Teaching in the Secondary Schools, Chicago: University of Chicago Press, 1939.

8. Chandler, B. J., Education and the Teacher, New York: Dodd, Mead, 1961.

9. Coombs, A. W., A Perceptual View of Teacher's Preparation, Allen and Bacon, 1965.

10. Dworkin, M. S., (ed.), Dewey on Education, New York: Teachers College, Columbia University, 1959

11. Gage, N. L. (ed.), Handbook of Research on Teaching, Rand McNally & Co., 1963.

12. Garrett, H. E., The Art of Good Teaching, New York: David McKay Co., 1964.

13. Gould, G., and Yoakam, G. A., The Teacher and His Work, (2nd Ed.), New York: The Ronald Press Co., 1954.

14. Hanson, K. H., High School Teaching, Englewood Cliffs: Prentice-Hall, 1957.

15. Haskew, L. D., This is Teaching, New York: Bureau of Publications, Teachers College, Columbia University, 1956.

16. Holliday, Leonore, Professional Pointers for Teachers, Education Council of Ohio Educations Association, 1952.

17. Holman, Mary U., How it Feels to be a Teacher, New York: Bureau of Publications, Teachers College, Columbia University, 1950.

18. Hughes, M., Development of the Means for Assessing the Quality of Teaching in Elementary Schools, Office of Education, 1959.

19. Knoell, D. M., Predictions of Teaching Success from Word Fluency Data, (Journal of Educational Research 949), 1956, P. 703-708.

20. "A Program of Education for Elementary Schools," Maryland: Public Schools of Baltimore County, 1953.

21. Metropolitan School Study Council, The Newly Appointed Teacher, New York: Bureau of Publications, Teachers College, Columbia University, 1950.

22. Mursell, J. L., Successful Teaching, (2nd Ed.), New York: McGraw-Hill, 1954.

23. Noor, Gertrude, Teaching and Learning the Democratic Way, Englewood Cliffs: Prentice-Hall, 1965.

24. Peters, H. J., Burnett, C. W., and Farwell, G. F., Introduction to Teaching, MacMillan, 1963.

25. Rokeach, M., The Open and Closed Mind, Basic Books, Inc., 1960.

26. Ryans, D. G., Characteristics of Teachers, American Council on Education, Washington, 1960.

27. Selvidge, R. W., and Fryklund, V. C., Principles of Trade and Industrial Teaching, Peoria, Illinois: Manual Arts Press, 1930.

28. Shirer, W. L., The Challenge of Scandinavia, Boston: Little, Brown, and C., 1955.

29. Wynn, R., Careers in Education, New York: McGraw-Hill, 1960.

APPENDIX R

TEACHER EDUCATION FOR THE AMERICAN INDUSTRY PROJECT

by

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A Paper Presented At the
Upper Midwest Vocational Teacher Education Conference
On Developing Innovative Vocational-Technical Teacher
Education Programs

May 14, 1968

American Industry Project
USOE Contract No. OE-5-85-060
Co-Directors: Eugene R. F. Flug
Wesley L. Face

TEACHER EDUCATION FOR THE AMERICAN INDUSTRY PROJECT

Saying anything very optimistic about the available research on teachers and teacher characteristics and their impact on the education of the children is not really the in thing to do these days. We need not search very far for support for this attitude either. Two of the most prestigous publications dealing with the subject, the Handbook of Research on Teaching, and the recent Colemen Report, Equality of Educational Opportunity are, if anything, pessimistic about the possibility of deriving any useful information from the plethora of research data.

If such caution will prevent us from acting foolishly upon unfounded inferences, one can only applaud. However, I am afraid that the result too often has been that we do not act at all and we use such pessimistic pronouncements as an excuse for our inaction. By contrast, I rather prefer the attitude of the dean of a School of Education who shall remain anonymous. When approached about some innovative idea he would usually respond - "go ahead and try - most of what is being down now is probably wrong so you are not likely to make things much worse and maybe you will make some improvement." Although hardly brimming with optimism, there is, at least, a willingness to try and to take a certain amount of calculated risk.

With that thought in mind - of accepting the calculated risk - I would like to outline the major elements of our Teacher Education program.

In the illustration (fig. 1) are shown the various elements of our program. Solid lines indicate elements which are fully operational. Dashed lines - - - indicate elements which are partially operational and dotted lines represent elements still in the planning stage. It is especially pertinent to notice that the three main elements of the program, liberal studies, professional studies and major studies are all taken simultaneously over the four year period rather than stacking them in layers as is the more common practice. I will detail each of the elements shown in the illustration in the following order:

I. Teacher Model
II. Structure of the Curriculum
    A. General Studies
    B. Major Studies - Individualized Instruction - Field Experience
    C. Interdisciplinary Seminar
    D. Professional Studies
        1. teaching lab - student teaching
        2. professional seminar
        3. learning lab - individualized continual progress instruction
        4. clinical professorship
        5. video taped student teaching/internship

I. The Teacher Model was developed to provide objectives for the development of curriculum. We hoped to come up with information that would tell us what to do for people who wished to be teachers that would help them to accomplish this goal. That such an undertaking is not entirely outside the realm of possibility is indicated by N. L. Gage in his article "Can Science Contribute to the Art of Teaching".

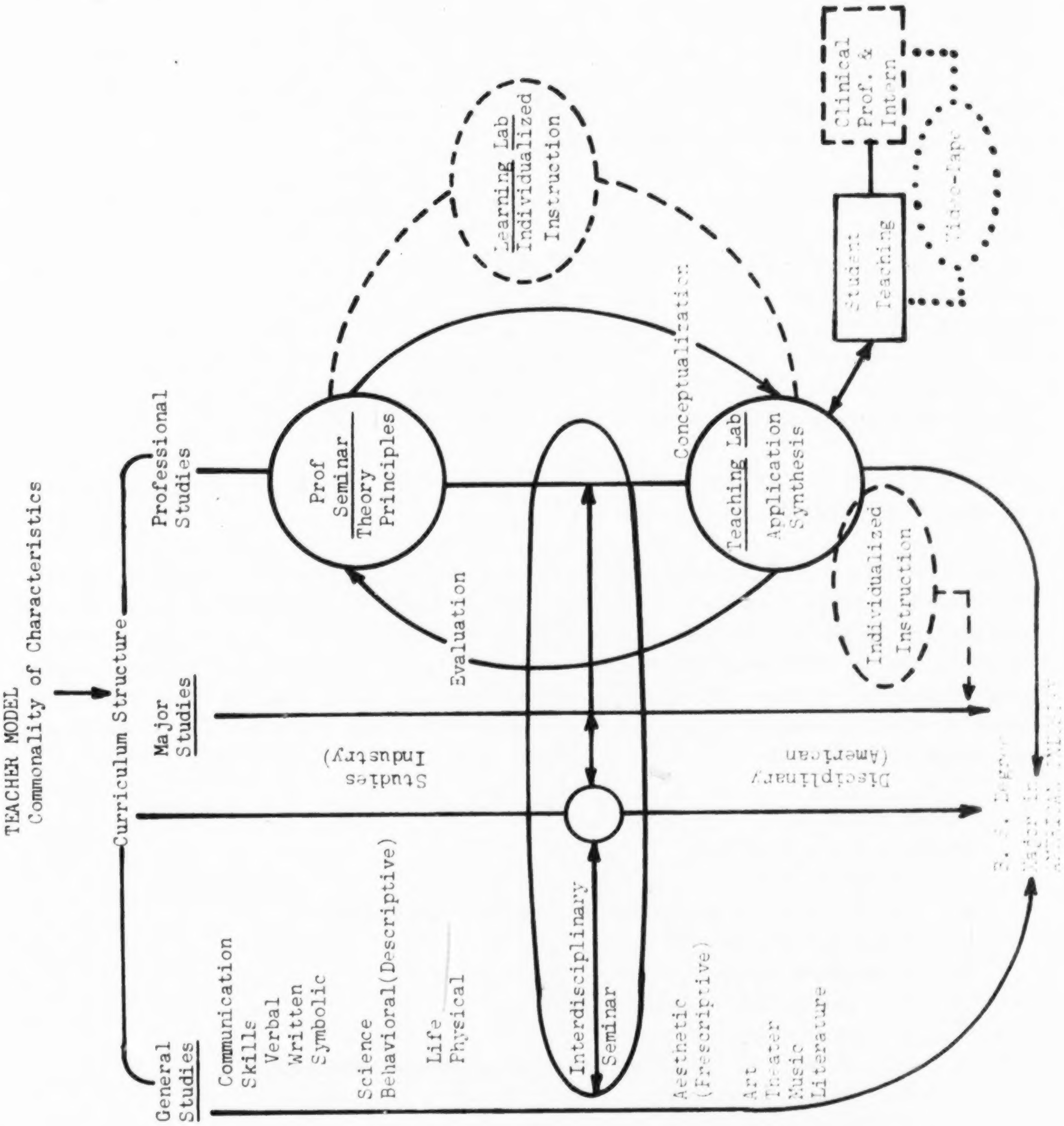

TEACHER MODEL
Commonality of Characteristics
Curriculum Structure
General Studies
Major Studies
Professional Studies
Communication Skills
Verbal
Written
Symbolic
Science
Behavioral (Descriptive)
Life
Physical
Aesthetic (Prescriptive)
Art
Theater
Music
Literature
Interdisciplinary Seminar
Studies (Industry)
Disciplinary (American
Prof Seminar
Theory
Principles
Evaluation
Conceptualization
Teaching Lab
Application
Synthesis
Learning Lab
Individualized
Instruction
Individualized
Instruction
Student Teaching
Clinical Prof. & Intern
Video-Tape
B. S. Degree
Major in

Figure 1

The teacher model was not conceived of as an original development, nor was it intended to project a stereotype model teacher. It is a structuring of available information into a form which provides guidance for curriculum development. The model is flexible and intended to provide for change as additional data is brought into it.

Two sources were used for the collection of the data: A review of literature and interviews.

The data were sorted into four cells.

1.1 Modifiable - supported by opinion.
1.2 Modifiable - supported by data.
2.1 Non-modifiable - supported by opinion
2.2 Non-modifiable- supported by data

	(1) Supported by Opinion	(2) Supported by Data
Modifiable (1)		
Non-modifiable (2)		

In many cases different instruments were used in several studies relating to a given point of view. This raised the question of whether the several instruments were, in fact, getting at the same things.

The question was resolved as well as possible by analyzing the instruments involved and the inferences drawn from it. If the instruments and inference were consistent, then the dimension they represented was accepted in an appropriate cell.

In the general sense, three types of criteria were found to have been used in the data which were collected; student gain, rater evaluation, and logical agrument. The first two criteria were considered as offering support to a dimension through empirical data; the last, logical argument, was considered as offering support through opinion. Precedence of validity was given to these three criteria in the following order: (1) student gain, (2) rater evaluation, and (3) logical argument.

Where the collected data were not consistent, precedence was given to data representing the above criteria, in the order given. In each such case, attention was given to the design of the study, the appropriateness of the conclusions, and the appropriateness of the statistics needed.

Consideration was also given to the relevance of the logical argument. As these conflicts of internal consistency were resolved in favor of a given point of view, it was taken as a teacher dimension, supported by empirical data or opinion, depending upon the resolution. If there was no agreement or if the weight of evidence did not substantially support one point of view, then, the dimension was not included. A dimension may be included on the basis of support by opinion alone if there was considerable body of consistent opinion and only a little research.

Within both classifications, supported by opinion and supported by empirical data, there was a classification by modifiability. That is, modifiable or not modifiable.

Modifiable implied those teacher dimensions which may be predictably effected by the direct actions of a teacher under typical classroom conditions. Knowledge of subject matter is a dimension of this classification.

Not modifiable implied those teacher dimensions which may not be predictably effected by the direct actions of a teacher under typical conditions. The various personality characteristics are dimensions of this classification.

This illustration shows the model with a few of the dimensions in place.

	Supported by opinion 1	Supported by data 2
Modifiable 1	1.1.1 Has consistent philosophy 1.1.3 Relates to school and community 1.1.8 Acceptable personal appearance	1.2.2 Can establish set 1.2.3 Uses appropriate forms of reference 1.2.10 Has broad cultural interests 1.2.13 Knows his subject
Non-modifiable 2	2.1.1 Acceptable physical appearance 2.1.2 Acceptable societal model	2.2.2 Is flexible 2.2.4 Good intelligence 2.2.5 Energetic

This classification system permits both a rational classification of existing information and facilitates the storage and retrieval of new information by cell code, number, and letter subscripts. If new data supports or rejects a given dimension, this may be recorded on the classification by a + or a -. This permits the revision of teacher dimensions as additional data becomes available. This is an on-going procedure. Dimensions may be added, eliminated, or relocated with ease. Because of the limited amount of data available concerning some of the dimensions, their present location is probably rather tentative.

One test of the validity of the model is presently underway through the integration of the model with a series of research studies being conducted by Dr. Wayne Courtney. Through a series of previous studies, Dr. Courtney has been identifying competencies required by, and common to, all vocational or occupational teachers.

In his latest study, which is national in scope, the refined competencies have been ordered in accord with the dimension of the teacher mode. Five hundred teachers from ten states will be involved in the latest study. The results may be available in the fall.

II. The structuring of the curriculum was a tedious process. Department heads, deans, and selected instructors were interviewed to determine two items: one, the objective of the courses for which they were responsible; and two, how they determined when these objectives had been met. We gave up the second item after a while because it became readily apparent that evaluation had little relationship to the objectives.

In due course we came up with a list of teacher dimensions in one hand and a list of course objectives in the other hand. Then we began matching one set with the other. We quickly found that if we used all available objectives and balanced the dimensions as equally as possible the curriculum would cover about seven years and a few summers.

The curriculum was reduced to four years plus one summer for 132 credits which is an obvious bow to tradition. Since there were very few institutional or state limitations the curriculum reflects rather well the influence of the model.

A. The General Studies represent about 60 hours of the curriculum or slightly less than 1/2 of the total time. This included mathematics; English; physical, life and behavioral sciences; theater; art; music; and physical education.

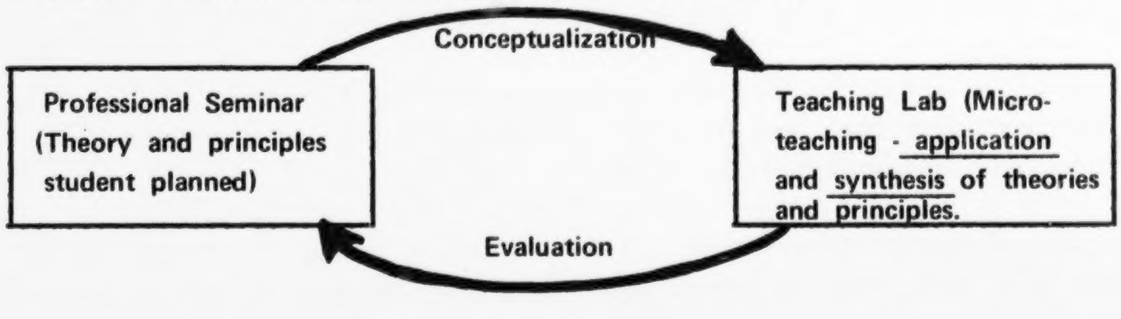
B. The Major Studies represent about 34 credit hours. Because their content is not especially pertinent for this presentation I will not dwell upon it. However, it is probably pertinent to note that about 8 credit hours of the work will soon be moving into an individualized continual progress format. Objectives, format and the design of the instructional packages has been completed for about 1/2 of the 8 hours. We are waiting now to purchase the media to complete the instructional packages. Most of the hardware, such as projectors, is already available. Another relevant point is our requirement that the student spend at least one summer employed in industry.

C. The Interdisciplinary Seminar serves the function of creating a confrontation with the total interdisciplinary nature of the University. This session meets once per month. Three or more volunteer faculty from different disciplines meet with the student in a joint confrontation of a topic which is of concern to the student and interdisciplinary in nature. No credit is awarded, thus, there is no grade and therefore, the need to try and second guess the professor for a grade is reduced.

D. The Professional Studies are represented by a sequence titled Professional Teachers Education for American Industry, A,B,C,D,E,F, (Pro-T-Ed.) which is separated into two major elements - professional seminar and teaching laboratory.

1. The professional seminar provides for integration of supportive knowledge role evaluation, and evaluation of theories and principles of teaching and learning. The seminar format is used to facilitate the substantial amount of verbal interaction and self direction which seems necessary for internalization and integration. To provide for the analytical processes necessary to precede synthesis, the traditional course boundaries such as Educational Psychology, Introduction to Education, and similar courses, were eliminated and self-direction was stressed. The students identify and plan their own topics or develop topics from behavioral objectives prepared by the staff, or the staff may suggest possible topics. Typically all three are used. The process is one of helping and guiding the student as he prepares himself as a teacher. In this manner content is maintained while sequences and scope are normally determined by the interest and motivation of the students.

A graphic illustration of the learning system is shown below.


Conceptualization
Professional Seminar (Theory and principles student planned)
Teaching Lab (Micro-teaching - application and synthesis of theories and principles.
Evaluation

Each seminar session is audio-taped, edited and transcribed. The summary is distributed to both staff and students before the next session and serves as a permanet record of the substantive content covered and the depth to which it has pursued. Each student participates in the professional seminar four hours per week and in teaching laboratory once each week.

2. The teaching laboratory used video taped micro-teaching, an approach adapted from the Standford University STEP program. The teacher presents a five-minute lesson to a micro-class in the evening (four secondary school students are employed in each micro-class section). The following day the student and staff methodologist evaluate the lesson. The next week the revised lesson is re-taught to a different micro-class, video-taped, and evaluated.

The teaching laboratory provides evaluative feedback into the professional seminar which improves the integration of theory and practice. Presently, eighteen students may present lessons in a two and one-half hour period.

After satisfactory completion of the Pro T. Ed. sequence the student has earned 12 semester credits in professional education. He then enters nine weeks of student teaching for which eight credits are awarded. Pro. T. Ed. plus student teaching provides the sum of the teacher pre-service professional experiences.

Notice that the professional preparation of the teacher is begun in the freshman or sophomore year. This is done to provide adequate time for role acceptance or rejection with minimum threat. Early involvement in the process of teaching provides skill development in implementing the learning/teaching process, while providing realistic simulation of the teacher role. Students also become active in outside teaching activities in evening school, church, scouts, tutoring, and similar positions.

In developing the professional teacher education program we have maintained the position that the devleopment of a committed and competent teacher is independent of the subject to be taught. Inferences drawn from the teacher model have forced this conclusion and suggest that the following major objectives should be met to prepare such a teacher. These include:

1. Acceptance of and commitment to the role of the teacher.

2. Sufficient experience with the role of the teacher to accept or reject the role before it is too late to change.

3. Sufficient skill implementing the learning process to bring about predictable changes in the behavior of students.

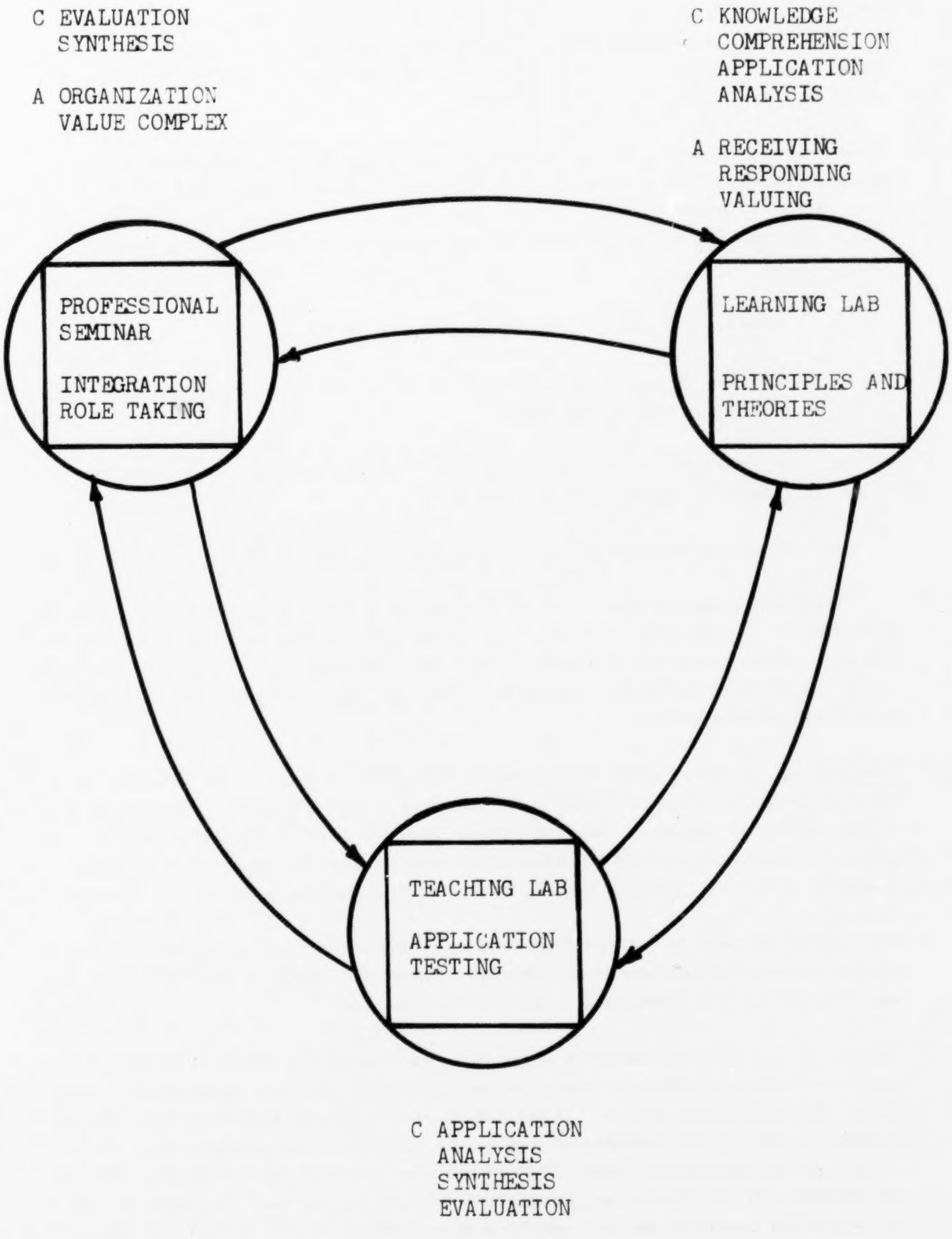
4. Ability to integrate the knowledges and skills required of a professional educator.

These broad objectives and their implications have served as guides for the design of the program. Specific behavioral objectives for the program have been developed and are constantly being refined and expanded. These objectives have begun to serve as the basis for an individualized continued progress curriculum for teacher education which is in the early stages of development.

3. The Learning Lab development centers around the implementation of the individualized continual progress curriculum format for professional teacher education. Presently we have a large number of objectives specified and we have a few instructional packages in operation. The packages presently operational deal with teaching strategies, teaching acts, evaluation, behavioral objectives and the construction of learning packages.

The learning lab with its individualized continuous progress curriculum will be made up of discrete instructional packages which allow the students to achieve at their individual learning rates. When fully operational it will function like this.

When a student, with the assistance of an instructor, selects a particular instructional package in his individual learning program, he takes a pre-test based on the behavioral objectives in the instructional package. If the pre-test results indicate that he is ready for the concepts or skills in the instructional package, he selects from the package those which fit his own unique learning style. (The pre-test may also show he has already mastered the objectives for that particular package in which case he may take the post test. If he successfully completes the post test he may proceed to another instructional package.)


C EVALUATION
SYNTHESIS
A ORGANIZATION
VALUE COMPLEX
C KNOWLEDGE
COMPREHENSION
APPLICATION
ANALYSIS
A RECEIVING
RESPONDING
VALUING
PROFESSIONAL SEMINAR
INTEGRATION
ROLE TAKING
LEARNING LAB
PRINCIPLES AND THEORIES
TEACHING LAB
APPLICATION
TESTING
C APPLICATION
ANALYSIS
SYNTHESIS
EVALUATION
A VALUING
ORGANIZING

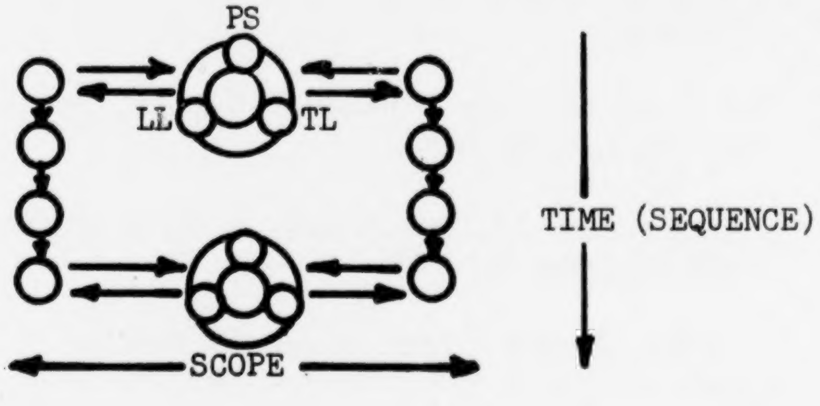
When the student feels that he has achieved all of the behavioral objectives in an instructional package, he may take a self-test. If the self-test results indicate that he is ready for instructor evaluation, the student can request the post-test for his instructional package. Upon successful completion of the post-test, the student may proceed to his next instructional package or he may undertake independent study.

If the student elects to participate in independent study, he defines a problem for in-depth or in-breadth study, and conducts research to achieve some level of resolution of his problem.

During the entire learning sequence the instructor provides as many opportunities as possible for student-teacher and student-student interaction during conferences and seminars. The instructor monitors each student's progress, diagnoses learning problems, and evaluates each student's progress in achieving stated behavioral objectives. An individualized continuous progress curriculum provides a much more personalized teaching-learning situation for both the teacher and the student.

A graphic illustration of the relationship between the existing Pro. T. Ed. seminar and teaching laboratory and the learning lab with its individualized continuous progress curriculum is shown in the following illustration.

Because of the individualization of some of the major studies and professional studies and the streaming of all studies the relationships among the various components looks something like this:



4. A pilot program to explore and develop the role and function of the clinical professorship was begun last fall. When fully operative this will support the extension of the system into the off-campus learning experience through intern teaching. We will then be able to move much of the material dealing with administration, facilities, school organizations out of the realm of "talking about it" into the realm of reality. To support this extension we are planning to use portable video tape equipment to help evaluate teaching skills. Present equipment is not much more noticeable than a hand held movie camera and causes very little distrubance in the classroom. When recording is done by classified personnel or student assistants the cost is extremely reasonable when compared with the cost of a professor making personal observation and critique.

In summary - having begun with a model of the effective teacher we have attempted to develop a curriculum which is consistent with that model.

The characteristics of the program include (a) a seminar in which theories and principles of teaching are developed (b) time during which the student may conceptualize these knowledges; (c) utilization of a teaching laboratory for application and synthesis of the knowledges; (d) provision for self and faculty evaluation; (e) the opportunity for internalization during seminar discussion, which completes the cycle. We feel that our success lies in the demonstration of the feasibility of a systematic and integrated approach to the preparation of a professional teacher.

REFERENCES

Courtney, F.W. Graduate Studies in Education No. 2, Vol. III, 1968; A Conceptual basis for Developing Common Curricula in Teacher Education Programs for Occupational Education.

Gage, W.L. "Can Science Contribute to the Art of Teaching". Phi Delta Kappan. Volume XLIX, No. 7, March, 1968.

Sedwick, L. K. Teacher Model: A Model to Guide Curriculum Development for the American Industry Project, Stout State University, Menomonie, Wisconsin, Mimeo, 1966.

——— Teacher Education Program for American Industry: A Model and a Curriculum. Paper delivered at AVA Convention, 1966, Stout State University, Menomonie, Wisconsin, Mimeo, 1966.

——— Misfeldt, H. T. "Micro-Teaching": New Tool for a New Program, Industrial Arts and Vocational Education, June, 1967.

Appendix S

Professional Teacher Competencies:
Student's Copy

by

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Harlyn T. Misfeldt
School of Education
Stout State University
Menomonie, Wisconsin

May, 1971

Competencies
(1-100)

	Name/ Initial	Date
1. The teacher trainee will be able to describe the function of the following individuals and the certification requirements of those starred.	______	______

1.1 Superintendent of Schools* ______
1.2 Principal* ______
1.3 Curriculum Coordinator ______
1.4 Speech Therapist* ______
1.5 Guidance Counselor* ______
1.6 School Psychologist* ______
1.7 Assistant Principal ______
1.8 Special Education ______
1.9 Department Head ______
1.10 Trainee's Own major and/or minor field ______

Wisconsin Department of Public Instruction, Certification Standards.

Morphet, Edgar L., Johns and Reller, Educational Administration, pp. 241-242; 248; 232-284.

Clark, Lein & Burks, The American Secondary School Curriculum, pp. 375-376.

Dumas and Beckner, Introduction to Secondary Education: A Foundations Approach, p. 272.

2. The teacher trainee will be able to describe the characteristics, advantages, and disadvantages of the lock step salary schedule, merit pay, and teacher ranking or rating system.	______	______

Dumas and Beckner, Introduction to Secondary Education: A Foundations Approach, pp. 349-350.

Morphet, Johns & Reller, Educational Administration, pp. 354-356; 356-358.

Hoover, Learning and Teaching in the Secondary School, 2nd ed., pp. 373; 546-548.

3. The teacher trainee will be able to list the essential information included in a teacher's contract. ________ ________

Morphet, Johns and Reller, Educational Administration, p. 353.

4. The teacher trainee will be able to list the major purposes and functions of the following professional associations as well as recognize their relationship to teach other. ________ ________

4.1 National Education Assoc. (National) ________
4.2 Wisconsin Education Assoc. (State) ________
4.3 Menomonie Education Assoc. (Local) ________
4.4 American Federation of Teachers ________

Goals of AFT; Questions & Answers of AFT

4.5 American Educational Research Assoc. ________
4.6 Classroom Teachers Assoc. ________
4.7 North Central Assoc. of Colleges and Secondary Schools ________
4.8 Association for Supervision and Curriculum Development ________
4.9 Trainee's Own Major Field Association(s) ________

Johanson, Collins, Johnson & Carley, American Education, pp. 335-360.

Bent and Kronenberg, Principles of Secondary Education, p. 166.

Clark, Lein and Burks, The American Secondary School Curriculum, pp. 400-401.

5. The teacher trainee will demonstrate through his participation in the the professional education seminar, his ability to work effectively with his peers. ________ ________

Seminar

6. The teacher trainee will be able to describe the function of the following organizations: ________ ________

6.1 United States Office of Education ______
6.2 State Department of Education ______
6.3 Local School Board ______

Morphet, Johns, & Reller, Educational Administration, pp. 237-238; 200-201.

Dumas and Beckner, Introduction to Secondary Education, pp. 294-295.

7. The teacher trainee will be able to describe the characteristics and functions of a teachers retirement system and social security. ______ ______

Personnel Office, Stout State University

8. The teacher trainee will be able to list at least six areas of concern discussed in the Code of Ethics for Teachers. ______ ______

Dumas and Beckner, Introduction to Secondary Education: A Foundations Approach, pp. 361-364.

9. The teacher trainee will develop at least six techniques to use to assist in teaching related to the following areas: ______ ______

9.1 Classroom discipline ______
9.2 Motivation in the classroom ______
9.3 Techniques to build pupil-teacher rapport ______
9.4 Techniques to build co-worker relationships ______

Film – Teaching Skills, General Learning Corp.

Hoover, Learning and Teaching in the Secondary School, 2nd ed., pp. 584-601.

Dumas and Beckner, Introduction to Secondary Education: A Foundations Approach, pp. 250-254.

Johansen, Collins, Johnson, & Carley, American Education, p. 261.

10. The teacher trainee will be able to identify the purposes of advanced work beyond the Bachelor's degree in terms of: ________ ________

10.1 Legal requirements ________
10.2 Salary adjustments ________
10.3 Professional improvement ________
10.4 Personal satisfaction ________

11. The teacher trainee will be able to explain and discuss the meaning of the following school finance terms: ________ ________

11.1 Basic Aid ________
11.2 Equalization Aid ________
11.3 Mill Levy ________
11.4 School Bond ________
11.5 Average Daily Attendance ________

Bent and Kronenberg, Principles of Secondary Education, pp. 61-63.

Morphet, Johns & Reller, Educational Administration, p. 492; pp. 503-504.

12. The teacher trainee will be able to identify the sources of public school revenue and the appropriate contribution (%) of each source. ________ ________

Bent and Kronenberg, Principles of Secondary Education, pp. 61-63.

Morphet, Johns, & Reller, Educational Administration, pp. 509-511.

13. The teacher trainee will be able to explain the status of the law in regard to the following, and also several common ethical interpretations, as well as his own ethical interpretation: ________ ________

13.1 Loco parentis ________
13.2 Tort ________
13.3 Unattended classroom ________
13.4 Transporting students in personal car ________
13.5 Negligence ________
13.6 Contracting ________
13.7 Immoral conduct ________
13.8 Board of Education ________

Drury and Ray, Essentials of School Law,
pp. 128-131; pp. 70-74; 26-29; 38-40;
134-135; 123-126; 116-117.

14. The teacher trainee will be able to list two or more advantages and disadvantages of school consolidation.

Bent and Kronenberg, Principles of Secondary
Education, p. 59.

Drury and Ray, Essentials of School Law,
p. 86; pp. 88-89.

15. The teacher trainee will be able to explain in his own words at least five types of insurance commonly carried by school districts.

Morphet, Johns, & Reller, Educational Administration, pp. 486-490.

16. The teacher trainee will be able to explain the role of the vocational schools and the dual educational system in Wisconsin.

Morphet, Johns, & Reller, Educational Administration, pp. 335-337.

Bent and Kronenberg, Principles of Secondary
Education, pp. 299-309.

Johansen, Collins, Johnson & Carley, p. 52; p. 64.

17. The teacher trainee will be able to explain the role of the private and parochial schools and their origin in the United States.

Film – History of Education in the 16th - 18th
Centuries, L. Sedgwick

Morphet, Johns & Reller, Educational Administration, p. 18; pp. 25-27; 521-522.

18. After viewing and discussing the film, "Education in America - 17th & 18th Centuries", the teacher trainee will be able to list at least six factors that came out of that era that have a direct influence on education in the United States today.

Film – History of Education in the 16th – 18th Centuries, L. Sedgwick

Film – Education in America – 17th & 18th Centuries

19. After viewing and discussing the film, "Education in America – 19th Century", the teacher trainee will be able to list at least six factors that came out of that era that have a direct influence on education in the United States today.

Film – Education in America – 19th Century

20. The teacher trainee will be able to list at least one difference and one likeness of each of the following countries in relation to the United States:
    England –
    France –
    Germany –
    Russia –
    Two other countries of the student's choice

Bent and Kronenberg, Principles of Secondary Education, pp. 113-130.

21. After doing 18, 19, 20, and studying the Cardinal Principles of Education, the Four Objectives of Education of the NEA Policies Commission of 1938, the Ten Imperative Needs of Youth (1944), the White House Conference on Education (1955), and the objectives of education today, the teacher trainee will be able to write a short paper of not more than two pages relating the changes and commonalities that have taken place in America up to the present time.

Materials listed, and –

Bent and Kronenberg, Principles of Secondary Education, p. 38; p. 42.

Johansen, Collins, Johnson, & Carley, American Education, p. 182.

22. After studying and discussing new innovations and predictions for education, the teacher trainee will write a short paper of not more than two pages on what his ideas are concerning the future of education at the secondary level.

23. The teacher trainee will be able to compare the traditional high school organization, The New Design for High School Education (Bush and Allen), the continuous progress concept (Kapher, Esbensen, Glasser) and the Trump plan in terms of: ________ ________

23.1 Basic assumptions, purposes ________
23.2 Staff utilization ________
23.3 Types and purposes of instruction ________
23.4 Student activities ________
23.5 Grouping ________
23.6 Guidance ________
23.7 Scheduling ________
23.8 Class size ________
23.9 Facilities ________
23.10 Student evaluation ________
23.11 Curriculum ________

Materials listed, and –

Esbensen, Working With Individualized Instruction

Trump & Baynham, Guide to Better Schools

Johansen, Collens, Johnson, Carley, American Education, p. 276; 319; 48; 378.

Dumas and Beckner, Introduction to Secondary Education, p. 311; pp. 224-225.

Clark, Klein & Burks, The American Secondary School Curriculum, pp. 370-393.

24. The teacher trainee will be able to build a rationale case for supporting one or any combination of the following methods of high school organization. ________ ________

24.1 Traditional ________
24.2 The New Design of High School Education________
24.3 The Continuous Progress Concept ________
24.4 The Trump Plan ________

Material listed in 23

25. The teacher trainee will write a short research paper demonstrating his ability to integrate published research. ______ ______

Library and Resource Center

26. The teacher trainee will demonstrate that he reads professional journal(s) by his citations in ______ ______ ______

Library and Resource Center

27. The teacher trainee will be able to list the major purposes and functions of the following publications: ______ ______

- 27.1 National Education Association Journal (Education Today) ______
- 27.2 Wisconsin Education Association Journal ______
- 27.3 American Vocational Journal ______
- 27.4 Nation's Schools or like journal in administration ______
- 27.5 Phi Delta Kappan and/or Pi Lambda Theta ______
- 27.6 Journal in teacher trainee's major field ______

Competencies (101-200)

Name/ Initial ________ Date ________

101. The teacher trainee will be able to define educational psychology in his own words. The attributes of the definition will include: ________ ________

    101.1 Educational psychology is a behavioral science. ________

    Lindgren, Educational Psychology in the Classroom, 3 ed., p. 4.

    101.2 Educational psychology contributes methods, empirical information, principles, and theory for the improvement of learning ________

102. The teacher trainee will be able to describe the following seven groups of varibles affecting the efficiency of learning: ________ ________

    102.1 Characteristics of learners ________

    Biehler, Robert F., Psychology Applied to Teaching, chapter 3 & 4

    102.2 Characteristics of the teacher ________
    102.3 The subject matter ________
    102.4 The behavior of the teacher and learners ________
    102.5 Characteristics of the group ________

    Cronbach, Educational Psychology, 2nd ed., chapter 5

    102.6 Physical characteristics of the setting ________
    102.7 Outside forces ________

    Biehler, Psychology Applied to Teaching

103. The teacher trainee will, based on his experiences in microteaching and/or student teaching, be able to (1) place the seven groups of variables affecting the efficiency of learning in a rank order and (2) defend his reason for placing the variables in this particular order. ________ ________

104. The teacher trainee will be able to state the relationships among: ________ ________

    104.1 Emperical information ________
    104.2 Generalizations ________

    Cronbach, Educational Psychology, 2nd ed., chapter 11

    104.3 Hypotheses ________
    104.4 Theory ________

105. The teacher trainee will be able to identify the purposes of any science as being able to: ________ ________

105.1 Understand ________
105.2 Predict ________
105.3 Control ________

106. The teacher trainee will be able to (1) place the purposes of any science in a rank order on the basis of their importance to educational psychology and defend the particular rank order or (2) indicate that ranking the purposes of science is not possible and present a rational to support this belief. ________ ________

107. The teacher trainee will be able to (1) define the following words, (2) arrange them in relationship to each other, and (3) defend his reason for placing them in this particular order. ________ ________

107.1 Ability ________

Cronbach, Educational Psychology,
2nd ed., chapter 7

107.2 Capacity ________
107.3 Learning ________
107.4 Objectives ________

108. The teacher trainee will be able to identify the major generalization(s) and/or principle(s) associated with the following theories and/or individuals. ________ ________

108.1 Purposeful learning – Klausmeier, Goodwin ________
108.2 Conditioning – Staats, Skinner ________
108.3 Imitative learning – Bandura, Walters ________
108.4 Subsumption – Ausubel ________
108.5 Assimilation and accommodation – Piaget ________

Biehler, Psychology Applied to Teaching,
p. 309, p. 80.

Jersild, Child Psychology, chapter 7

109. Given a learning activity, the teacher trainee will be able to identify the theory and individuals responsible for the theory exemplified by the activity. ________ ________

110. Given a theory and/or individual, the teacher trainee will be able to design a learning activity that exemplifies the generalizations and /or principles expressed in the theory or by the individual. ________ ________

111. The teacher trainee will be able to develop and define his adaptation of a theory/theories of learning ________ ________

Biehler, Psychology Applied to Teaching,
Chapter 2 & Part 3

112. Given a learning activity, the teacher trainee will be able to explain the pros and/or cons of the activity on the basis of a learning theory. ________ ________

113. The teacher trainee will recognize that pupil characteristics are the primary, or most important, variable affecting: ________ ________

113.1 Readiness for learning ________

Biehler, Psychology Applied to
Teaching, p. 31.

Cronbach, Educational Psychology,
2nd ed., Chapter 7.

113.2 Progress in learning ________

Cronbach, Educational Psychology,
2nd ed., Chapter 7

113.3 Upper limits of learning ________

114. The teacher trainee will be able to describe the following six pupil characteristics that affect learning efficiency: ________ ________

114.1 Cognitive abilities ________
114.2 Psychomotor abilities ________
114.3 Affective abilities ________
114.4 Effects of home and social class ________
114.5 Age ________
114.6 Sex ________

Biehler, Psychology Applied to Teaching,
Chapter 5; p. 279; pp. 300-305; pp. 110-111, 122

115. The teacher trainee will be able to: ______ ______

115.1 a. Rank in the order of importance the pupil characteristics affecting learning, or

b. partially rank in the order of importance the pupil characteristics affecting learning, or

c. indicate that ranking pupil characteristics affecting learning is not possible. ______

115.2 Defend, on the basis of research, his reaction to 116.1 ______

116. The teacher trainee will be able to list and describe the following three factors affecting efficiency of learning in the cognitive domain: ______ ______

116.1 General intellectual ability ______

Biehler, Psychology Applied to Teaching, pp. 215-217.

116.2 Specific intellectual ability ______
116.3 Previous experiences related to the task ______

117. The teacher trainee will be able to: ______ ______

117.1 Rank in the order of importance the three factors affecting efficiency of learning in the cognitive domain ______
117.2 Defend, on the basis of research, his reaction to 117.1 ______

118. The teacher trainee will be able to defend and/or refute on the basis of research, each of the following statements: ______ ______

118.1 Intellectual ability is fixed and unchangeable. ______

Biehler, Psychology Applied to Teaching, pp. 32-39; 439-445.

118.2 An individual's potentiality for all types of activity is determined by heredity. ______

Biehler, Psychology Applied to Teaching, pp. 32-39; 439-445.

119. The teacher trainee will be able to: ________ ________

119.1 Indicate the relationship(s) that exist between psychomotor ability and achievement in academic subjects. ________
119.2 Indicate the value of psychomotor abilities in predicting achievement in academic subjects. ________

120. The teacher trainee will be able to describe the relationship(s) that exist between organismic age and: ________ ________

120.1 Predicting academic achievement ________
120.2 Affective behavior ________
120.3 Psychomotor abilities ________

121. The teacher trainee will be able to describe relationship(s) that exist between: ________ ________

121.1 Affective characteristics and efficiency of learning ________
121.2 Affective characteristics and environmental influence ________

122. The teacher trainee will be able to describe relationship(s) that exist between: ________ ________

122.1 a. Age
b. Developmental characteristics ________
122.2 a. Developmental characteristics
b. Emotional behavior and social adjustment ________
122.3 a. Emotional behavior and social adjustment
b. Learning efficiency ________

123. The teacher trainee will be able to develop and defend a rational, on the basis of research, for either of the following statements: ________ ________

123.1 Chronological age should be used as a criterion for grade placement ________
123.2 Chronological age should not be used as a criterion for grade placement ________

124. The teacher trainee will be able to: ________ ________

124.1 Indicate the relationship(s) that exist between sex and:

a. Physical characteristics ________
b. Intelligence ________
c. Play, games, etc. ________
d. Vocational interests ________
e. Agressive and dominant behavior ________
f. Neuroticism ________
g. Divergent and convergent thinking ________
h. Interests ________

124.2 From the relationship(s) established in 124.1 develop a generalization concerning the most significant and insignificant differences between the sexes. ________

124.3 From the relationships established in 124.1 indicate, and logically defend, a possible implication(s) for each of the traditional curriculum areas. ________

125. The teacher trainee will be able to develop a generalization concerning the relationship(s) between: ________ ________

A. Learning efficiency
B. Home background
C. Social class

Competencies (201-300)

Name/ Initial Date

201. The student will be able to demonstrate his understanding (through a written or oral statement) of the history of guidance services by being able to identify trends, periods of development, important historical milestones, and theories basis for guidance and counseling. ________ ________

202. The student is expected to be able to express, orally or in writing, a personal philosophy of human growth and development and the nature of man. ________ ________

203. The student shall give evidence, either written or oral, that his attitude toward the individual is that the individual is of central importance in the guidance program specifically, and in the total educational process in general. ________ ________

204. The student will be able to verbalize, orally or written form, general principles which will enable him to analyze the development factors of child and/or adolescents in the learning process. ________ ________

205. The student will be able to explain, orally or written form, the development of what ever perceptions relative to the role and function of the school counselor. ________ ________

206. The student will be expected to differentiate, in oral or written form, the roles and responsibilities of the administration, classroom teachers, and the school counselor, their unique responsibilities and their inter-related-ness in relationship to school guidance. ________ ________

207. The student shall be able to list and describe, either orally or written form, the various guidance services of the school, and how these services may implement and enhance the school's development of the guidance point of view. ________ ________

Harcout, Brase and World, A Study Kit for Measurement Students

208. The student will be able to explain how selected guidance materials, instruments and techniques may be used to: ________ ________

(1) assist the student to understand himself better.
(2) assist the school staff to understand the student better.

209. The student shall be able to verbalize in written or oral form the guidance approach to education so that it supports the school's primary objective of instruction in subject matter and total individual growth. ________ ________

210. The student will be able to state in verbal or written form, his own decision as to whether or not to continue in his course of professional preparation leading to certification as a school counselor. ________ ________

Competencies (301-400)

Name/ Initial   Date

301. Develop behavioral objective(s) for lessons that specify: ________ ________

- A. Who is to be doing the learning.
- B. The observable behavior the students will demonstrate as a result of their learning experience.
- C. The conditions under which the behavior is to occur.
- D. The minimum level of acceptable performance.

Sedgwick, Behavioral Objectives for the Teaching, Learning Process

302. The teacher trainee will be able to operate and maintain the following audio-visual equipment as evidenced by properly utilizing the equipment either in seminars, micro-teaching, student teaching, or demonstrating the operation of said equipment to the staff member responsible for certifying his competencies. ________ ________

Self Instruction Lab Trailer No. 13

303. The teacher trainee will be able to properly splice a: ________ ________

303.1 16mm film . . . . ________
303.2 Film strip . . . . ________
303.3 Audio Tape . . . . ________

Self Instruction Lab Trailer No. 13

304. Given a situation, the teacher trainee will be able to properly use the: ________ ________

304.1 Chalkboard . . . . ________
304.2 Feltboard . . . . ________
304.3 Magnetic Board . . . . ________

Self Instruction Lab Trailer No. 13

305. Given a situation, the teacher trainee will be able to develop and produce the following instructional media: ________ ________

305.1 Audio tape . . . . ________
305.2 Overhead transparency . . . . ________
305.3 Chart . . . . ________
305.4 Graph . . . . ________
305.5 Poster . . . . ________
305.6 Bulletin board display . . . . ________

Self Instruction Lab Trailer No. 13

306. The teacher trainee will be able to operate the following reproduction equipment. ________ ________

306.1 Ditto machine . . . . ________
306.2 Copying machine . . . . ________

307. The teacher trainee will be able to list 3 or more major sources of instructional media for his major. ________ ________

Curriculum Center in Library

308. General: The student should be able to identify and state educational objectives in behavioral terms. ________ ________

A. Specific: The student should correctly select from sets of educational objectives those which are stated in terms of measurable student behavior.

B. Specific: The student should select from sets of educational objectives those which specify a minimally acceptable level of measurable performance.

C. Specific: Given general descriptions of several instructional objectives, the student should be able to write educational objectives which specify the behavior of the students, the acceptable performance level and (if important) any significant conditions under which performance will be evaluated.

Sedgwick, Behavioral Objective for the Teaching, Learning, Process

309. General: The student should be able to describe certain teacher actions which may promote good pupil discipline in varied situations.

A. Specific: Given a description of a public school classroom in which poor discipline exists, the student should describe in writing at least ten teacher actions (of the fifteen cited in class) which might result in improved discipline.

Discipline: Film strip and Tape, Vincent Associates

310. General: For different types of instructional techniques, e.g., lecture, discussion, etc., the student should be able to choose certain procedures which are appropriate.

A. Specific: Given a specific instructional objective, the student should choose whether a discussion, lecture or demonstration approach would be more suitable for achieving the objective.

B. Specific: Given descriptions of three teachers' use of one of the above instructional techniques, the student should select the teacher not violating one of the rules for using that particular technique.

Appropriate Practice: Film and Tape, Vincent Associates

311. Given the situation, the teacher trainee will be able to develop general course objectives.

Curriculum Rationale: Film strip and Tape, Vincent Associates

312. The teacher trainee will be able to write two or more behavioral objectives for each level of understanding in the cognitive domain of Bloom's *Taxonomy of Educational Objectives*, Krathwohl's *Taxonomy of Educational Objectives: The Affective Domain*, and Simpson's *Taxonomy of Educational Objectives: The Psychomotor Domain.*

Rowling & Igl, *Writing Behavioral Objectives for the Cognitive Domain*

Igl, *Writing Behavioral Objectives for the Affective Domain*

Igl, *Writing Behavioral Objectives for the Psychomotor Domain*

313. The teacher trainee will be able to list and describe the three domains in Taxonomy of Educational Objectives. ________ ________

Mini package On Taxonomy, Igl

314. Given a list of objectives, the teacher trainee will be able to classify them as being in the cognitive, affective, or psychomotor domain of Taxonomy of Educational Objectives. ________ ________

Mini package On Taxonomy, Igl

315. The teacher trainee will be able to describe some relationships that exist between the three domains in Taxonomy of Educational Objectives. ________ ________

Competencies (401-500)

Name/ Initial Date

401. The teacher trainee will be able to identify the purpose(s), general requirements for graduation, and general requirements for admission for each of the following degree programs: ________ ________

401.1 Bachelor of Arts ________
401.2 Bachelor of Science ________
401.3 Master of Arts ________
401.4 Master of Science ________
401.5 Specialist ________
401.6 Doctor of Philosophy ________
401.7 Doctor of Education ________

402. The teacher trainee will become actively involved in a professional association(s). ________ ________

403. The teacher trainee will be able to describe a "successful" teacher on the basis of interrelationships of the following perspectives. ________ ________

403.1 Cognitive abilities ________
403.2 Psychomotor abilities ________
403.3 Affective characteristics ________
403.4 Age ________
403.5 Sex ________

Biehler, Psychology Applied to Teaching, p. 111

403.6 Social class ________

404. General: The student should be able to select, plan and use learning activities which incorporate five generally accepted principles of learning. Namely: ________ ________

Appropriate Practice
Individual Differentiation
Perceived Purpose
Knowledge of Results
Graduated Sequence

Specific:

A. Given two or more learning principles and a detailed description of a teacher's action in an instructional setting, the student should identify which of the principles, if any, the teacher is clearly using.

Film strip & tape - "Appropriate Practice, Perceived Purpose, Knowledge of Results," Vimcet Associates.

B. Given a particular learning principle along with descriptions of three teachers; actions in an instructional setting, the student should select the teacher most effectively (presumptive effectiveness) incorporating the learning principle according to the stated criteria.

C. Given assignments to teach, public school pupils, the student should plan and carry out learning activities which, insofar as the situation permits, incorporates the previously mentioned learning principles.

405. General: The student should be able to properly interpret the results of preassessment procedures. ______ ______

Specific:

A. Given descriptions of three teachers who are preassessing their students, the student should select the teacher making the appropriate inference and, subsequently, the correct instructional decision.

Film strip & tape - "Analyzing Learning Outcomes", Vincet Associates.

406. The teacher trainee will be able to indicate how giving teachers extensive knowledge about their pupils affects: ______ ______

406.1 Student Achievement ______
406.2 Student Attitudes ______

Rosenthal, Pygmalion in the Classroom

407. The teacher trainee will be able to formulate an instructional principle relating psychomotor abilities and teaching effectiveness.

Klausmeir & Goodman, Learning and Human Abilities, pp. 142-143.

408. The teacher trainee will be able to describe the relationship(s) between teaching success and the teacher's:

408.1 Interests
408.2 Attitudes
408.3 Values
408.4 Personality organization

Competencies (501-600)

Name/ Initial   Date

501. Develop a lesson plan for each micro-lesson that includes: ______ ______

- **A. Behavioral objective(s).**
- **B. Resources.**
- **C. Equipment and materials.**
- **D. Content outline.**
- **E. Teacher activities.**
- **F. Student activities.**
- **G. Evaluation procedure.**

Behavioral Objectives for Teaching Learning Process, Sedgwick

502. General: The student should be able to apply a systematic rationale in the selection of curricular objectives. ______ ______

A. Specific: The student will submit a personally prepared essay illustrating the appropriate application of five points of the Tyler rationale to curricular objectives in his subject field, stating the objectives in behavioral terms.

Curriculum Rationale: Film strip and Tape, Vincent Associates

503. General: The student should be able to distinguish between (1) Course of Study, (2) Resource Unit, (3) Teaching Unit, (4) Lesson Plan and (5) Assignment. ______ ______

A. Specific: Given definitions of the following terms, the student should correctly match the terms with the definition: Curriculum, scope, sequence, fusion, correlation, core, general education, experience curriculum, broad fields, subject and syllabus.

Teaching Units and Lesson Plans: Film strip and Tape, Vincent Associates

504. General: The student should be able to identify additional terms representing the basic technical vocabulary used by educators in connection with curriculum considerations. ______ ______

A. Specific: Given definitions of the following terms, the student should correctly match the terms

with the definition: curriculum, scope, sequence, fusion, correlation, core, general education, experience curriculum, broad fields, subject and syllabus.

Teaching Units and Lesson Plans: Film strip and Tape, Vincent Associates

505. General: The student should be able to construct a teaching unit.

A. Specific: The student will submit an individually prepared teaching unit covering a duration of at least three weeks in a subject field of his own choosing. The unit will incorporate the four main components of the instructional paradigm.

Teaching Units and Lesson Plans: Film strip and Tape, Vincent Associates

506. General: The student should be able to construct a lesson plan.

A. Specific: The student will submit two individually prepared lesson plans which incorporate the four main components of the instructional paradigm.

Teaching Units and Lessons Plans: Film strip and Tape, Vincent Associates

507. General: The student should understand the meaning of key technical terms used in evaluation considerations.

A. Specific: Given a set of definitions, the student should correctly match the following terms with the appropriate definition: (1) Validity, (2) Reliability, (3) Correlations, (4) Item Analysis, (5) Standardized Test and (6) Percentile.

B. Specific: The student should correctly answer multiple choice questions which treat the relationship between validity, reliability and correlation.

Evaluations: Film strip and Tape, Vincent Associates
Making Your Own Tests: Three Film strips and Tapes, Educational Testing Service

508. General: The student should be able to make proper instructional inferences from pupil performance on evaluation measures.

A. Specific: Given descriptions of pupil performance in an evaluation situation, the student should correctly select accurate inferences from several alternative interpretations.

Knowledge of Results: Film strip and Tape, Vincent Associates

509. General: The student should be disposed to view, (1) measurement as a less then perfectly precise technique and (2) grading as a highly subjective, value-laden process. ______ ______

A. Specific: When presented with a series of statements regarding the presision of measurement and the accuracy of grading, the student should rate all answers in such a way as to reveal an attitude consistant with this general objective.

Making Your Own Tests, Educational Testing Service

510. General: The student should learn how to improve objective tests through simple item analysis procedures. ______ ______

A. Specific: The student should correctly answer a series of questions related to the steps in carrying out a simple item analysis operation.

Making Your Own Tests, Educational Testing Service

511. General: The student should be able to identify approved practices in administering and scoring tests. ______ ______

A. Specific: Presented with descriptions of test administration and scoring practices, the student will identify those generally approved.

Making Your Own Tests, Educational Testing Service

512. Develop an instructional package including: ______ ______

A. Behavioral objective(s). ,
B. Student pre-test
C. Student learning activities involving more than one media.
D. Student post-test

How to Make an Instructional Package, Igl.

513. Given a situation, the teacher trainee will be able to choose, from the following list, the most appropriate method(s) of student evaluation. ______ ______

A. Student observation
    1. Critical incidence
    2. Check list
    3. Rating scale
    4. Anacdotal record

Klausner and Goodrich, Learning and Human Abilities, pp. 622-640.

514. The teacher trainee will be able to properly construct and use the the following evaluative devices: ________ ________

A. Student observation
    1. Critical incidence
    2. Check list
    3. Rating scale
    4. Anacdotal record
B. Objective tests
    1. Multiple choice
    2. True-false
    3. Simple recall
    4. Matching
    5. Arrangement
    6. Listing
C. Essay tests

Making Your Own Tests, Educational Testing Services

Competencies (601-700)

Name/ Initial — Date

601. Demonstrate successful performance teaching a minimum of 2 out of 3 lessons utilizing deductive teaching strategies at each of the following cognitive levels as evidenced by obtaining satisfactory or better supervisor's rating on the teacher competence appraisal guide designed for evaluating this activity. ______ ______

601.1 Knowledge ______
601.2 Comprehension ______
601.3 Application ______
601.4 Analysis ______

Micro-teaching

602. Demonstrate successful performance teaching a minimum of 2 out of 3 lessons utilizing inductive teaching strategies at each of the following cognitive levels as evidenced by obtaining satisfactory or better supervisor's rating on the teachers' competence appraisal guide designed for evaluating this activity. ______ ______

602.1 Synthesis ______
602.2 Evaluation ______

603. The teacher trainee will demonstrate acceptance of the teaching role by becoming involved in community "teacher-like" activities. ______ ______

Seminar – Student Teaching

604. The teacher trainee will demonstrate a concern for the total school program. He will see himself as part of the total school endeavor and will actively work with teachers, students, and administrators to bring about the success of the program. ______ ______

Seminar – Student Teaching

605. The teacher trainee will obtain an average (no. 3) or better cumulative rating on all appraisal guides used to assess his performance in student teaching. ______ ______

606. The teacher trainee will demonstrate through micro-teaching and/or student teaching good human relations in student-teacher relationships. ______ ______

607. The teacher trainee will demonstrate through student teaching his effectiveness in school-staff relationships. ______ ______

608. The teacher trainee will demonstrate while student teaching that he understands the particular community contest in which he works, that he helps to translate the purposes of the schools' program to the community, and that he is a responsible member of the community. ______ ______

Seminar – Student teaching

609. The teacher trainee will demonstrate through his participation in student teaching, his ability to work effectively with his peers. ______ ______

Seminar – Student teaching

Competencies (701-800)

701-705 Demonstrate successful performance in each of the following teaching skills as evidenced by obtaining satisfactory of better supervisor rating on the teacher competence appraisal guide designed for evaluating each skill in 2 out of 3 attempts:

701. Presentation Skills

    701.1 Completeness of Communication
    701.2 Lecturing
    701.3 Use of Examples
    701.4 Planned Repetition

702. Creating Student Involvement

    702.1 Set Induction
    702.2 Stimulus Variation
    702.3 Closure

703. Increasing Student Participation

    703.1 Reinforcement
    703.2 Recognizing Attending Behavior
    703.3 Silence and Nonverbal Cues
    703.4 Cueing

704. Response Repertoire

    704.1 Verbal Responses
    704.2 Nonverbal Responses
    704.3 Verbal and Nonverbal Responses

705. Questioning Skills

    705.1 Fluency in Asking Questions
    705.2 Probing Questions
    705.3 Higher Order Questions
    705.4 Divergent Questions

706. Students will increasingly question structures, functions and contents of:

    A. Schools
    B. Teaching-learning
    C. Cultural-ethnic influences on teacher, student, administration

D. Evaluation (and grading)
E. History and philosophy of education
F. Human relations
G. Personal growth

707. Students will increasingly plan, do, and evaluate their own activities (with focus on Pro. T. Ed.)

A. By establishing individual and group plans
B. Carrying through these plans
C. Evaluating in many forms (matrices, check lists, rating scales, tests, discussion, ets.)

Planning
Activities
Outcome

708. Students will increasingly commit themselves to their own personal human, educational, scientific philosophy as evidenced by:

A. Defense of action and thought consistent with philosophy.
B. Development of increasingly clear, complete, concise and consistent statements of what, how and why to do.
C. Sensitive listening to others evidenced by providing feedback which is accurate (in judgement of the receiver).
D. Tolerance for opposing views held by others.

709. Students will increasingly recognize and use meanings in various symbolic forms--both as barriers and carriers.

A. Fewer hang-ups of verification
B. Increased use of perceived meanings (increased "aha phenomens")
C. The medium at least sometimes is the message.

710. Students will become increasingly aware of "non-sense" evidenced by:

A. Enjoying tangents, plays on words, perceptions of others, etc.
B. Demanding that the group come back to the decided focus.
C. "Toying" with new ideas, materials, structures, etc.

711. Students will become increasingly aware of affective, physical, sense communication.

A. In selecting role playing as a model for trial-learning.
B. In using music and art as media and message.
C. In experimenting with physical position, movement, and contact as expression of questions, meanings, and problem solving.
D. In reducing ruts by perceiving multi-modes.
E. In "learning self".

APPENDIX T

CURRICULUM REQUIREMENTS FOR THE AMERICAN INDUSTRY MAJOR BACHELOR OF SCIENCE DEGREE

Harry Olstad
Director of the Major
School of Industry and Technology
Stout State University
Menomonie, Wisconsin

May, 1970

American Industry Project
USOE Contract No. OE-5-85-060
Director: Eugene R. F. Flug

CURRICULUM FOR THE BACHELOR OF SCIENCE DEGREE WITH THE MAJOR IN AMERICAN INDUSTRY
(Preparation to Teach in Secondary Schools)

General Requirements:

Minimum total for graduation	130 credits
Minimum required in education	20 credits
Minimum required in the major field	34 credits
Minimum required in general studies (Men)	56 credits
(Women)	55 credits
Elective (Men)	20 credits
(Women)	21 credits

The American Industry curriculum prepares a student to teach American Industry at the junior and senior high school level. The University recommends that American Industry be required of all boys and girls at the 8th grade level and that it be availble on an elective basis at other grade levels.

The College program involves completion of one of the following options:

1. A major in American Industry with an approved 22 credit minor. These minors are described in the departmental course description of the University catalog.

2. A major in American Industry with no minor. Elective credits distributed to enhance the students own objectives.

3. A double major - American Industry and another recognized major. This option is worked out on an individual basis between the student, his American Industry advisor and the advisor from the second major. The student considering this option should anticipate some additional summer session work and/or extra semester of work.

The major in American Industry may be elected during the Freshman or Sophomore years. Both men and women are encouraged to apply for admission. Should a student choose to enter the American Industry program after the Sophomore year, he may do so if he is willing to assume the burden of an extended program.

Freshman:

First Semester	Credit	Second Semester	Credit
355-120, Math	4	102-438, Energy	2
367-127 a-b, Phy Ed, Men		102-210, Communications	2
368-128 a-b, Phy Ed, Women	2	355-120, Math	4
326-102 a, English Comp[1]	3	407-360, A-V Instruction	2
391-106, Fund of Speech	2	102-310, Materials	2
102-115, Structures and Concepts	2	326-102 b, English Comp	3
102-123, Processes I	4	Electives	2
	17		17

[1] Students must meet proficiency requirements for entry into Pro T Ed 401-205 D.

Sophomore:

First Semester		Second Semester	
311-115, Inorganic Chemistry	5	372-421, Physics	5
401-205A, Pro T Ed	2	401-205B, Pro T Ed	2
102-223, Industrial Relations	2	102-214, Transportation	2
497-123, General Psychology	3	387-309, General Sociology	3
367-101, Personal Health, Men	1	365-101, Philosophy	3
Electives, Women - 5 Men -	4	Electives	2
	17		17

Junior:

First Semester		Second Semester	
196-314, Production Systems	3	150-413, Manufacturing Cost Anal	3
401-205C, Pro T Ed	2	401-205D, Pro T Ed	2
150-300, Production Management	3	309-330, Principles of Marketing	3
102-402, Physical Facilities	2	375-311, Government	3
391-200, 340, 444, or 445, Theater	3-2	304-106, 390 or 206, Art	3-2
Electives	3-4	Electives	3-4
	16		17

Summer Session:

102-197, Field Experience	2

Senior:

First Semester	
401-205E (1 qr), Pro T Ed	2
449-408 (1 qr), Student Teaching	8
	10

Second Semester	
401-205F, Pro T Ed	2
308-122, Biology	3
326- , Literature	3
388-410, Modern World	3
360, , Music	2
Electives	4
	17

STOUT STATE UNIVERSITY
School of Applied Science & Technology
July, 1969

Student ______________________
Date ______________________
Other Colleges Attended ____________

FOUR—YEAR PROGRAM FOR THE DEGREE OF BACHELOR OF SCIENCE IN AMERICAN INDUSTRY

General Studies	Cr.	Est Sem	Cr Aw
Math (355-120,121)	8		
Personal Health, Men (367-101) and	1		
Phy Ed, Men (367-127 a-b) OR Women (368-128 a-b)	2		
English Comp. (326-102 a-b or aH-bH)	6		
General Sociology (387-309)	3		
General Psychology (479-123)	3		
Fund. of Speech (391-106)	2		
Philosophy (365-101)	3		
Physics (372-421)	5		
Inorganic Chemistry (311-115)	5		
Select 1 Music Course (360 -)	2		
Government (375-311)	3		
Select 1 Theater Course (391-200, 340, 444 or 445)	2-3		
Select 1 Literature Course (326-)	3		
Biology (308-122)	3		
Art - Select one (304-106,390,206)	2-3		
Modern World (399-410)	3		

Major Studies	Cr	Est Sem	Cr Aw
Structure & Concepts (102-115)	2		
Interdis. Sem. (102-100A,B,C,D, E,F)	0		
Processes I (102-123)	4		
Communications (102-210)	2		
Audio Visual Instruction (407-360)	2		
Indus. Relations (102-223)	2		
Transportation (102-214)	2		
Field Experience (102-197) 1 summer	2		
Manufacturing Cost Analysis (150-413)	3		
Materials (102-310)	2		
Production Mgt. (150-300)	3		
Princ. of Market (309-330)	3		
Physical Facil. (102-402)	2		
Energy (102-438)	2		
Prod. Systems (196-314)	3		
TOTAL	34		
Professional Educ. Studies			
Prof. Tchr. Ed. for A.I. (401-205A) (401-205B) (401-205C) (401-205D) (401-205E) (401-205F)	12		
Student Teaching (449-408)	8		
TOTAL	20		

Electives

Electives Option: (Choose One)
Major in __________
Minor in __________
Distributed __________

	Cr.	Est Sem	Cr Aw

General Studies		Major and Prof. Ed		Elec.	
Minimum, Men	56	Studies Total	54	TOTAL	20-21
Women	55				

Appendix U

Curriculum Requirements
For the Bachelor of Science Degree
In Industrial Education With a Dual Major
In American Industry and Industrial Arts

by

Lorry K. Sedgwick
Director of the Major
School of Applied Science and Technology

October, 1969

American Industry Project
USOE Contract No. OE-5-85-060
Co-Directors:
Dr. Eugene R. F. Flug
Dr. Wesley L. Face

100-1-5-2 and 100-2-2-2

INTRODUCTION

Since the period following World War II curriculum innovation in the secondary schools had tended, increasingly, to emphasize broader more generalizable skills and knowledges to prepare people for a rapidly changing future. This movement has shown itself particularly as a mejor curriculum emphasis upon basic principles, concepts, and significant processes. This has been true in all curricular areas, mathematics, social studies, science, English and the applied areas of home economics and industrial education.

Consonant with this emphasis in curriculum development Stout State University has developed American Industry to improve curriculum in the field of industrial education.

While developing a broad conceptual study program for industrial education the University also reorganizes its responsibility for the support of existing industrial arts programs where communities wish to maintain them.

Accepting its responsibility for both of these considerations, the University offers three degree programs in industrial arts education, industrial arts, American Industry, and the dual major. The program which provides the highest degree of employment opportunities from grades 7 through 12 is the dual major in American Industry/Industrial Arts. Over one half of the public school job requests which we receive could best be filled by people completing this program.

In the junior high school the University recommends that American Industry be required of all boys and girls at the 8th grade level and that it be available on an elective basis at other grade levels. It is recommended that those students whose teaching goals include junior high school be enrolled in the dual major American Industry/Industrial Arts Program.

STOUT STATE UNIVERSITY
Menomonie, Wisconsin

SCHOOL OF APPLIED SCIENCE & TECHNOLOGY

General Requirements:

1.

Minimum total credits required for graduation (men)	138
(women)	137
Minimum total credits required in General Education (men)	61
(women)	60
Minimum total credits required in Education	25
Minimum total credits required in technical work	52

2. Students qualifying for advanced placement, Independent Studies Honors Courses, or Waivers should consult with their advisor or the Program Director of the Dual Major program in making appopriate substitutions in their program.

3. The Outline of Courses is given for only the first two years. Anticipated changes in the curriculum which will reduce the total number of required credits make it necessary to plan only the first two years at present.

First Year:		Credit:
326-101-102,	English Comp.	6
391-106,	Speech	2
355-120-121,	Math	8
497-123,	Gen. Psychology	3
387-110,	Gen. Sociology	3
102-123,	Processes	4
102-115,	Structures and Concepts	2
148-101,	Drafting	2
157-127,	Metals	2
367-127,	Physical Education (a-b)	2
102-100A,	Interdisciplinary Seminar	0
	Total	34

Second Year:		
367-101,	Personal Health	1
137-117,	Introduction to Graphic Arts	2
196-103,	Woodworking	2
102-100B-C,	Interdisciplinary Seminar	0
401-205A-B,	Prof. Tchr. Ed.	4
196-203,	Plastics	2
176-202,	Power Mechanics	2
309-330,	Principles of Marketing	3
338-410,	Modern World	3
102-214	Transportation	2
365-101,	Philosophy	3
375-311,	Government	3
372-221,	Physics	5
102-223,	Industrial Relationships	2
	TOTAL	34

STOUT STATE UNIVERSITY
School of Applied Science & Technology
October, 1969

Student ____________________

Date ____________________

PROGRAM FOR THE DEGREE OF BACHELOR OF SCIENCE WITH A DUAL MAJOR IN AMERICAN INDUSTRY AND INDUSTRIAL ARTS
FOR STUDENTS INTERNING IN 1969

Minimum Total No. Credits Required for Graduation - 137

General Studies	Cr	Est Sem	Cr Aw	Major Studies	Cr	Est Sem	Cr Aw	Prof. Ed.Stud.
Math				Common Block				Prof.Tchr.Ed.
(355-120-121)	8			Processes I				for A.I.
Personal Health				(102-123)	4			(401-205A) 2
Men (367-101) &	1			Communications				(401-205B) 2
Phy Ed, Men				(102-210)	2			(401-205C) 2
(367-127 a-b)	2			Audio Visual Inst.				(401-205D) 2
OR				(407-360)	2			(401-205E) 2
Phy Ed, Women				Field Experince				(401-205F) 2
(368-128 a-b)	2			(102-197) Summer/	2			Cur. Dev.
English Comp.				Materials (102-310)	2			(449-404) 5
(326-101,102)	6			Energy (102-438)	2			Student Teaching
General Scoiology								(449-408) 8
(387-110)	3			American Industry				
General Psychology				Structure & Con-				
(497-123)	3			cepts (102-115)	2			Total-Prof. 25
Fund of Soeech				Interdis. Sem.				Stud.
(391-106)	2			(102-100A,B,C,D,				Electives
Philosophy				E,F)	0			(Not required)
(365-101)	3			Indus. Relations				
Physics (372-221)	5			(102-223)	2			
Inorganic Chem				Transportation				
(311-115)	5			(102-214)	2			
Select 1 Music				Production Mgt.				
Course (360-)	2			(150-300)	3			
Government				Prin. of Marketing				
(375-311)	3			(309-330)	3			
Select 1 Theater				Mfg. Cost Analysis				
Course (391- , 340,				(150-413)	3			
444 445)	2-3			Physical Facil.				
Select 1 Literature Course				(102-402)	2			
(326-)	3			Prod. Systems				
Biology (308-122)	3			(196-314)	3			
Select 1 Art				Industrial Arts				
Course (304-				Electricity				
106,390,206)	2-3			(124-208	2			
Modern World				Intro Graphic Arts				
(338-410)	3			(137-117)	2			
Writing Elective				Basic Drafting				
(352-)	3			(148-101)	2			
Speech Elective				Metals (157-102)	2			
(391-)	2			Power Mech (176-202	2			
				Woodwkg.(196-103)	2			
				Plastics(196-203)	2			

				Draft Elec(143) Metals Elec(157-)	2 2			Student Major Advisor
Total-Gen. Stud.	60 64			Total-Major Stud.	52			Distribution: 1.Student 2.Registrar 3.Advisor 4.Dean of SAST

Speech Electives

Select one of the following speech courses:

391-223	Essentials of Public Speaking	2 credits
391-320	Advanced Speech Activities	2 credits
391-322	Techniques of Group Leadership	2 credits
391-325	Discussion and Debate	2 credits
391-405	Speech Skills for Business and Industry (I.T. only)	2 credits
391-406	Speech Skills for Educators (I.E. only)	2 credits

Advanced Writing Electives

Select one of the following advanced writing courses:

326-346	Expository Writing	3 credits
326-344	Contemporary Rhetoric	3 credits
326-347	Critical Writing	3 credits

APPENDIX V

VIDEO TAPED MICRO-TEACHING

by

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Co-ordinator, Professional Teacher Education
American Industry Project
Stout State University
Menomonie, Wisconsin

April, 1968

American Industry Project
USOE Contract No. OE-5-85-060
Co-Directors: Eugene R. F. Flug
Wesley L. Face

VIDEO TAPED MICRO–TEACHING

Harlyn T. Misfeldt

The American Industry Project, unhampered in its development of new departures in its teacher education program at Stout State University, has made good use of a teacher training approach pioneered by Bush and Allen of Stanford University. Micro-teaching is a scaled down exercise in teaching whereby the teacher trainee teaches a brief five to twenty minute lesson to a small group of junior or senior high school students. Each sequence includes video-taping the lesson, critiquing the lesson, revising the lesson, reteaching the lesson to a different group of students, and critiquing the revised lesson. During each sequence the student teacher works on developing his ability in a specific well-defined teaching skill. The student teachers work on only one skill at a time in order to facilitate a meaningful analysis of the student teacher's behavior in comparison to a given video taped model. The purpose of micro-teaching is to provide an opportunity for the students preparing to teach to obtain a substantial amount of practice preceding their entrance into off campus student teacher under optimum control and evaluation conditions for the students teacher and at the same time without jeopardizing the learning of the secondary students.

The obvious advantage of micro-teaching is the opportunity for the teacher trainee to obtain substantial practice and self confidence prior to off campus student teaching. However, there are several other advantages that merit consideration:

1. Micro-teaching provides an opportunity for the teacher trainee to work on specific aspects of teaching rather than expecting him to become relatively competent in all of the skills during his student teaching experience.

2. The short controlled micro-lesson would appear to be a much more appropriate experience for the beginner than being thrust into an hour long presentation to a complete class which is the case in many student teaching experiences.

3. Micro-teaching permits greater control over practice in terms of the variety and type of students, physical facilities, content of the lesson, and length of the lesson.

4. Micro-teaching makes possible variations in the amount of practice in terms of the needs of the teacher trainee.

5. Micro-teaching increases the amount of meaningful practice possible within a limited amount of time, and makes the time and location more convenient for the staff.

6. Micro-teaching permits several people to evaluate and reevaluate a teaching performance under controlled conditions at periodic intervals.

7. Micro-teaching provides an opportunity for the teacher trainee to find out if he really likes teaching early in his college program.

Scheduling Formats

This section includes several scheduling formats, the advantages and disadvantages of each format, and the staff utilization and costs for each format. All time and cost figures are based on the following assumptions:

1. A professor's salary of $10,000 per year.
2. A work study student's salary of $1.50 per hour.
3. A micro-class of four students with each student being paid $1.00 per hour.
4. The micro-teaching session defined as a five-minute teach, a critique, a lesson revision, a five-minute reteach to a different class, and another critique.

The only reason for making these assumptions is to provide a standard base on which to figure costs so that the costs and staff utilization for the various scheduling formats may be compared. If the micro-teaching costs for a specific institution were to be determined, it would be necessary to revise these figures in terms of the costs and loads at that particular institution.

Scheduling Format I–A

Description: Scheduling format I-A is similar to that used in the STEP program at Stanford University. Under this scheduling format (see figure1) the typical micro-teaching sequence for each teacher trainee lasts approximately forty-five minutes. The teacher trainee presents a five-minute lesson which is videotaped. During the next ten minutes parts or all of the lesson may be played back for the teacher trainee and the supervising professor providing the opportunity for immediate feedback. Following this critique period, the teacher-trainee has approximately fifteen minutes to revise his lesson. The lesson is again recorded, played back, and critiqued. The teacher trainee teaches to a different group of students each time and receives feedback from the students in the form of ratings or comments. While teacher trainee No. 1 is revising his lesson and preparing for his next session, teacher trainee No. 2 is presenting his lesson and critiquing his performance with the supervising professor.

This format utilizes the professor to both record and critique each session and uses paid micro-class students. The micro-teaching must be done in the evening or on Saturday because of the necessity of securing micro-class students after school hours. This format allows the professor to process two student teachers per hour.

Advantages:

1. Provides immediate feedback

Time in min. / Participants	5	5	5	5	5	5	5	5	5	5	5	5
	Typical sequence for 1 student (45 minutes)											
	Typical sequence for 2 students (60 minutes)											
Teacher Trainee no. 1	Present lesson	Evaluation		Revise lesson			Present revised lesson	Evaluation		Leave		
Teacher Trainee no. 2		Arrive		Present lesson	Evaluation		Revise lesson			Present revised lesson	Evaluation	
Television Technician	Tape lesson	Play back tape		Tape lesson	Play back tape		Tape revised lesson	Play back tape		Tape revised lesson	Play back tape	
Supervisor	Observe lesson	Evaluation		Observe lesson	Evaluation		Observe revised lesson	Evaluation		Observe revised lesson	Evaluation	
Micro-class A	Receive lesson	Complete Eval. forms		Receive lesson	Complete eval. forms	Leave or stand by for next lesson						
Micro-class B	Arrive						Receive revised lesson	Complete eval. forms		Receive revised lesson	Complete eval forms	Leave or stand by

Figure 1

2. Professor provides the critique session

3. Easy to schedule. (Since the micro-teaching is done in the evening or on Saturday it is relatively easy to schedule micro-class students, student teachers, and facilities)

Disadvantages:

1. Relatively expensive

2. Must be done in the evening or on Saturday

3. Inefficient use of the micro-class (see figure1)

Cost and staff time per student teacher per session:

1.	Professor	30 minutes	$3.47
2.	Micro-class	30 minutes	2:00
			$5.47

Cost and staff time per 30 students (1 session per student):

1.	Professor	15 hours	$104.25
2.	Micro-class	15 hours	60.00
			$164.25

Scheduling Format I–B

Description: This format is the same as format I-A except that instead of the professor recording and critiquing, a capable work study student is responsible for both recording and critiquing each session (see figure 1). As in format I-A the micro-class students are paid and the micro-teaching must be done in the evening because of the necessity of securing micro-class students after school hours. This format does not require any of the professor's time.

Advantages:

1. Provides immediate feedback

2. Relatively inexpensive

3. Easy to schedule

Disadvantages:

1. Professor does not provide the critique session
2. Must be done in the evening or on Saturdays
3. Inefficient use of the micro-class

Cost and staff time per student teacher per session:

1.	Work study student	30 minutes	$ .75
2.	Micro-class	30 minutes	2.00
			$2.75

Cost and staff time per 30 students (1 lesson per student)

1.	Work study student	15 hours	$22.50
2.	Micro-class	15 hours	60.00
			$82.50

Scheduling Format I–C

Description: This format is the same as format I-A except that the micro-teaching is done in the local high school during the day and utilizes unpaid students on a voluntary basis from the study hall rather than hiring micro-class students and operating in the evening or on Saturday (see figure 1). As in format I-A the professor both records and critiques each session. This format allows the professor to process two student teachers per hour.

Advantages:

1. Provides immediate feedback
2. Can be done during the regular school day
3. Professor provides the critique session

Disadvantages:

1. Staff and student teachers must travel to the high school
2. Difficult to schedule

3. Inefficient use of the micro-class

Cost and staff time per student teacher per session:

1.	Professor	30 minutes	$3.47

Cost and staff time per 30 students (1 session per student teacher):

1.	Professor	15 hours	$104.25

Scheduling Format I–D

Description: This format is the same as format I-A except that as in format I-C the micro-teaching is done in the local high school during the day and utilizes unpaid students on a voluntary basis from the study hall. This format also utilizes a capable work study student to record and critique each session instead of the professor. As in format I-B this format does not require any of the professor's time.

Advantages:

1. Provides immediate feedback
2. Inexpensive
3. Can be done during the regular school day

Disadvantages:

1. Professor does not provide the critique session
2. Difficult to schedule
3. Inefficient use of the micro-class

Cost and staff time per student teacher per session :

1.	Work study student	30 minutes	$ .75

Cost and staff time per 30 students (1 session per student):

1.	Work study student	15 hours	$22.50

Scheduling Format II–A

Description: Under this scheduling format the teacher trainees teach in the evening, are critiqued the next day, revise their lesson, re-teach to a different group of students on another evening, and are critiqued the following day (see figure 2). A continuous schedule of five minute teach sessions are scheduled in the evening with two minutes between each lesson to facilitate the movement of teachers and instructional materials. After every fifth teach session there is a ten minute break allowing the work study person operating the video tape recorder to change tapes and prepare for the next group of five teachers. This break also allows the micro-class students to have a short stretch. On the following day the professor spends approximately fifteen minutes critiquing each lesson with the teacher trainee. The lesson is then revised and the same scheduling format is repeated for the re-teach session. This format allows the professor to process two students per hour.

Advantages:

1. Allows the taping to be done in the evening without the professor professor present.
2. Allows for more efficient utilization of the micro-class
3. Easy to schedule
4. Professor provides the critique session

Disadvantages:

1. Does not provide feedback until the next day
2. Relatively expensive

Cost and staff time per student teacher per session:

1.	Professor	32 minutes	$3.71
2.	Work study student	16 minutes	.40
3.	Micro-class	16 minutes	$1.06
			$5.17

Cost and staff time per 30 students (1 session per student teacher):

1.	Professor	16 hours	$111.20
2.	Work study student	8 hours	12.00

TAPING SCHEDULE			CRITIQUE SCHEDULE		
Start	*Stop*	*Teacher*	*Start*	*Stop*	*Teacher*
4:00	4:05	1	8:00	8:15	1
4:07	4:12	2	8:15	8:30	2
4:14	4:19	3	8:30	8:45	3
4:21	4:26	4	8:45	9:00	4
4:28	4:33	5	9:00	9:15	5
4:33	4:43	Break	9:15	9:30	6
4:43	4:48	6	9:30	9:45	7
4:50	4:55	7	9:45	10:00	8
4:57	5:02	8	10:00	10:15	Break
5:04	5:09	9	10:15	10:30	9
5:11	5:16	10	10:30	10:45	10
5:16	5:26	Break	10:45	11:00	11
5:26	5:31	11	11:00	11:15	12
5:33	5:38	12	11:15	11:30	13
5:40	5:45	13	11:30	11:45	14
5:47	5:52	14	11:45	12:00	15
5:54	5:59	15			
	etc.			etc.	

Figure 2

3.	Micro-class	1.06
		5.17

Scheduling Format II - B

Description: This format is the same as format II-A except that instead of the professor recording and critiquing, a capable work study student is responsible for both recording and critiquing each session (see figure 2). As in format II-A the micro-class students are paid and the micro-teaching must be done in the evening or on Saturday because of the necessity of securing micro-class students after school hours. This format does not require any of the professor's time.

Advantages:

1. Allows the taping to be done in the evening without the professor present.
2. Inexpensive
3. Allows for efficient utilization of the micro-class
4. Easy to schedule

Disadvantages:

1. Professor does not provide the critique session
2. Does not provide feedback until the next day

Cost and staff time per student teacher per session:

1.	Work study student	48 minutes	$1.20
2.	Micro-class	16 minutes	1.06
			$2.26

Cost and staff time per 30 students (1 session per student):

1.	Work study student	24 hours	$36.00
2.	Micro-class	8 hours	32.00
			$68.00

Scheduling Format II–C

Description: This format is the same as format II-A except that the micro-teaching is done in the local high school during the day and utilizes unpaid students on a voluntary basis from the study hall rather than hiring micro-class students and operating in the evening or on Saturday (see figure 2). As in format II-A a work study student records each session and the professor to process two student teachers per hour.

Advantages:

1. Can be done during the regular school day
2. Professor provides the critique session
3. Allows for efficient utilization of the micro-class

Disadvantages:

1. Does not provide feedback until the next day
2. Relatively expensive
3. More difficult to schedule

Cost and staff time per student teacher per session:

1.	Professor	32 minutes	$3.71
2.	Work study student	16 minutes	.40
			$4.11

Cost and staff time per 30 students (1 session per student):

1.	Professor	16 hours	$111.20
2.	Work study student	8 hours	12.00
			$123.00

Scheduling Format II–D

Description: This format is the same as format II-A except that as in format II-C the micro-teaching is in the local high school during the day and utilizes unpaid students on a voluntary basis from the study hall. This format uses a capable work study student to record and critique each session instead of the professor. As in format II-B this format does not require any of the professor's time.

Advantages:

1. Inexpensive
2. Can be done during the regular school day
3. Allows for efficient utilization of the micro-class

Disadvantages:

1. Professor does not provide the critique session
2. Difficult to schedule

Cost and staff time per student teacher per session:

1.	Work study student	48 minutes	$1.20

Cost and staff time per 30 students (1 session per student):

1.	Work study student	24 hours	$36.00

These are just a few examples of scheduling formats and how they affect staff utilization and costs. An almost infinite number of variations and combinations are possible with these basic formats to fit almost any situation or need. For example, in a particular situation it may be desirable to have work study students do part of the critiquing and the professor do part of the critiquing. This kind of a compromise would cut the micro-teaching cost and still allow the professor to participate in a substantial number of the micro-teaching sessions.

Another variation could include a work study student with one video tape recorder recording a continuous schedule of five minute lessons and two or more professors taking the tapes after each half-hour or hour and providing the critique session with another video tape recorder in another location. This kind of a schedule would require more equipment but would cut staff cost, make efficient use of the micro-class, and still provide almost immediate feedback.

A scheduling variation currently being used in Industrial Teacher Education at Stout allows each student teacher to present a short lesson or demonstration to a group of peers. The lesson is video taped and immediately replayed for the student teacher, professor, and peers for critiquing can take place during the regular school day and does not require secondary students. However, it does not provide for a re-teach or the opportunity to work with secondary students.

Probably the most important thing to be said about scheduling formats is not to be bound by a particular format just because somebody else developed it and found that it worked out well in their situation. The more realistic approach is to determine needs, available staff, and budget and then develop a schedule that will best meet these needs with the available resources.

Variations in Equipment Placement and Room Set-Up

In the most common room set-up the video tape recorder, monitor, and camera are placed behind the students with a microphone for the teacher and a microphone for the students. With this set-up the viewer gets an excellent picture of the teacher but very little indication of the student's reaction since all that can be seen of the students is the back of their heads.

An alternate set-up places a camera in a front corner of the room aimed at the students and the video tape recorder, two monitors, a switcher, and another camera are placed behind the students with a microphone for the teacher and a microphone for the students. This set-up has the obvious advantage of being able to tape either the teacher or the students and the obvious disadvantage of being more expensive.

An appropriate compromise between the one camera set-up and the two camera set-up might be to place just one camera at the side of the room directed at both the teacher and the students and add a wide angle lens.

Video Taping Equipment

In terms of quality, cost, and versatility we can probably draw a parallel between audio tape recording equipment and video tape recording equipment. It wasn't very many years ago that an audio tape recorder was relatively expensive and was portable only if you happened to have six men and a boy to help move it about. Presently audio tape recorders are relatively inexpensive and truly portable. This trend is already apparent in video tape recording equipment and we can probably expect to see further reductions in price, greater portability, and greater dependability.

The American Industry Professional Teacher Education Program is presently using a Sony video tape recorder, General Electric cameras, and Shabaden monotors. The equipment is about one year old, is used on the average of forty-one hours per week, is moved around the campus, in and out of cars, and is operated by several different people. About the only maintenance that has been required is cleaning the heads of the video tape recorder and occasionally repairing a worn connecting cable.

Accurate price quotations for video taping equipment will not be made in this paper because of the wide variety of equipment available and the frequency with which models and prices change. However, the approximate cost of the equipment currently being used by the

American Industry Professional Teacher Education Program is included below.

If one camera is used, the required equipment and cost would be approximately:

Video tape recorder	$ 995.00
Camera	500.00
2 microphones @ 18.50 each	37.00
Connecting cables	25.00
Tri-pod	100.00
Monitor	180.00
	$1837.00

If two cameras are used, the required equipment and cost would be approximately:

Video tape recorder	$ 995.00
2 cameras @ 500.00 each	1000.00
2 tri-pods @ 100.00 each	200.00
2 monitors @ 180.00 each	360.00
Switcher	100.00
2 microphones @ 18.50 each	37.00
Connecting cables	50.00
	$2742.00

If one camera equipped with a wide angle lens and placed at the side of the room is used, the required equipment and cost would be approximately:

Video tape recorder	$ 995.00
Camera	500.00
Wide angle lens	125.00
Monitor	180.00
Tri-pod	100.00
2 microphones @ 18.50 each	37.00
Connecting cables	50.00
	$1987.00

The Sony video tape recorder uses one-half inch tape at a cost of approximately $21 per half hour and $44 per hour. More sophisticated equipment uses one-inch tape at a cost of approximately $60 per hour. Experience has shown that when using a tape two or three times per week the tape will last approximately one year.

In summary it must be pointed out that regardless of what scheduling format is used and who does the critiquing, micro-teaching is more expensive than a traditional methods class (see figure 3). In the traditional methods class a professor can process 30 students for $6.95 or .27 per student and 30 students can be processed each hour.

Format	Cost / Session	Cost / 30 Students	Students / Hour
1-A	5.47	164.25	2
1-B	2.75	82.50	2
1-C	3.47	104.25	2
1-D	.75	22.50	2
2-A	5.17	155.20	2
2-B	2.26	68.00	2
2-C	4.11	123.20	2
2-D	1.20	36.00	2
Trad. Class	.27	6.95	30

Figure 3

It can be seen from figure 3 that even when using the most inexpensive scheduling format utilizing student help for critiquing it still costs $22.50 to process 30 students through one microteaching session for a cost of .75 per student and only two students can be processed per supervisor per hour.

Of course, one can always raise the question of whether or not the professor is really processing 30 students per hour (see figure 4). Maybe the professor has 28 warm bodies and is really only processing two students per hour in which case the cost would be $3.49 per student or $104.40 for 30 students. However, all this proves is that figures can lie and microteaching and the traditional methods class cannot realistically be compared.

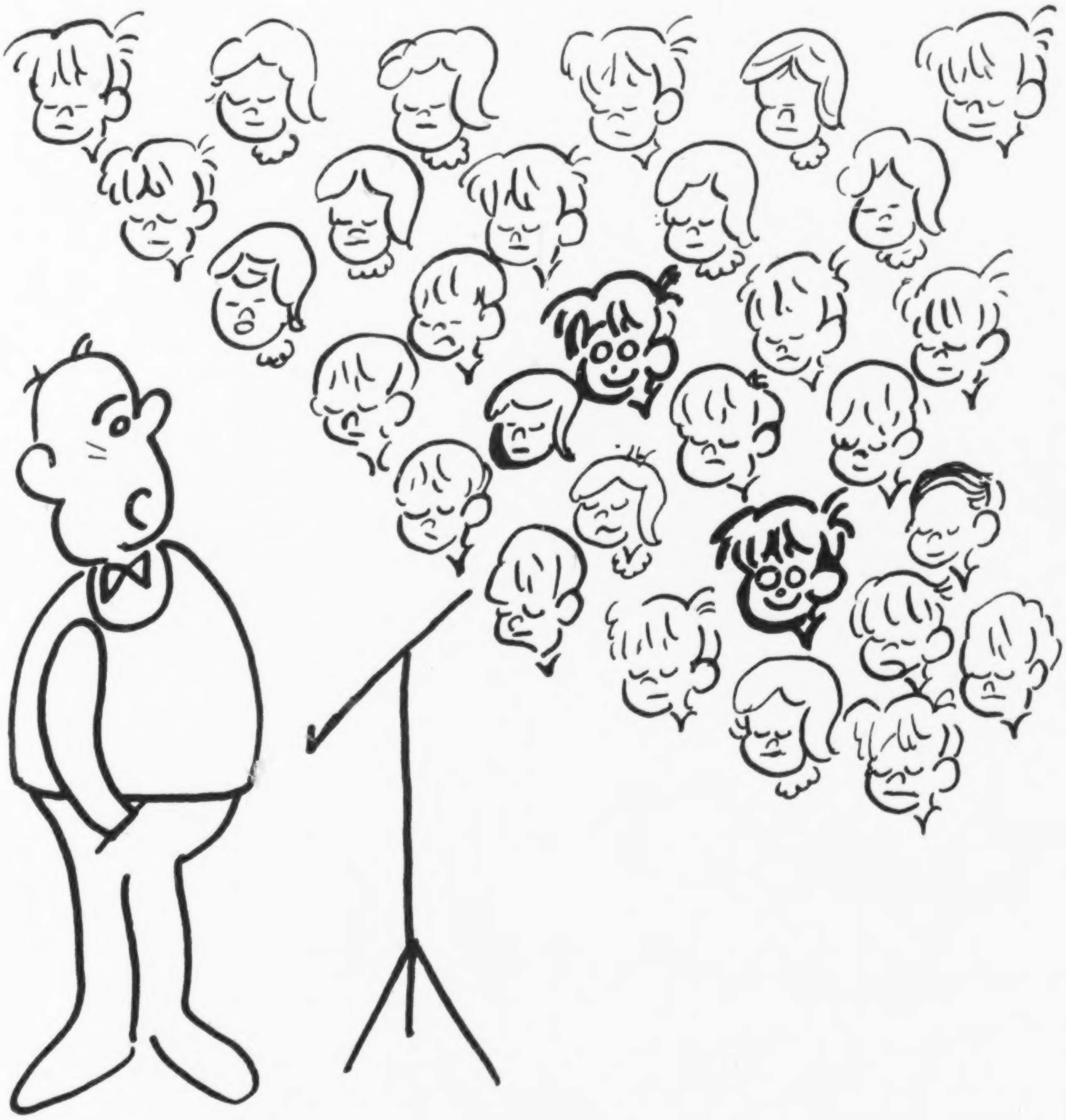

Figure 4